

# The Iron Age

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A Review of the Hardware, Iron and Metal Trades.

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## Iron Making at Buffalo.

The Buffalo Business Men's Association, of which Mr. P. J. Ferris is secretary, has been discussing the question of iron manufacture at Buffalo, and has had a number of communications from Mr. T. D. Ledyard, of Toronto, who is interested in Canadian mining property. One of these letters reads as follows:

"Since writing you on 5th inst. I have noticed some figures in a paper read by Mr. John Birkinbine, of Philadelphia, before the American Institute of Mining Engineers assembled at Duluth. An account of this paper is given in *The Iron Age* of 4th inst. (page 23). In the second column is given the cost of making pig iron respectively at Duluth, Cleveland and Chicago. This comparison shows 75 cents per ton in favor of Duluth over Cleveland, and nearly \$2 per ton over Chicago. I presume that Buffalo can get coke as cheaply as Cleveland, and pig iron could therefore be made in Buffalo

We may add to the above that those interested in the large Gogebic consolidations are very ambitious in their projects of not alone supplying the West, but of crowding out Spanish and African ore in the East also. To reach the Hudson River valley they must ship to Buffalo, and even now a large contract for Vermillion ore to the Troy works is being filled, the ore going via that city. The serious drawback to manufacturing pig iron at that point is, however, the coke. Connelleville would be considerably dearer than the figure named, and Walston, though a good fuel, has not yet proven its equality to it and may be still stated to be on trial.

## The Kennedy & Scott Furnace Charging Apparatus.

Many and various devices for feeding blast-furnaces with skip hoist have been invented, in order that a uniform distribution of stock may be obtained, one of which,

The segmental doors *g* being closed, as in Fig. 1, the stock is dumped into the hopper from the skip, then the segments *g* are permitted to fall, which causes the stock to fall centrally upon the cone *d* of the bell and thereby is distributed equally in the chamber *b* around the bell. The segments are then closed and the operation repeated until the desired quantity of stock is collected in chamber *b* around the bell. The bell *D* is lowered and the stock drops into the furnace uniformly on all sides and the bell is raised again to place. This construction acts not only to secure a uniform feeding of the furnace, but also as a perfect gas seal, because the chamber *b* is tight and the segments *g* are closed when the *d* is open; also, the bell *d* is closed when the segments *g* are open. Therefore, there is no time when the top is open to permit the escape of gas, and, consequently, no heat is wasted at the top, and the irregular action of the blast heating stoves, due to the periodical escaping of gas

and carrying from 5 to 10 per cent. at a cost of \$4 per pound of the aluminium contained.

## Technical Graduates in Railroad Service.

The *Stevens Indicator* for July publishes the following letter from Mr. Edward B. Wall, superintendent of motive power of the Pittsburgh, Cincinnati and St. Louis Railway Company and a graduate of Stevens. The letter was in reply to inquiries of President Morton, and expresses with great sense certain facts which students and teachers should know:

COLUMBUS, OHIO, July 5, 1887.

Henry Morton, Esq., President Stevens Institute, Hoboken, N. J.— \* \* \* The conditions under which graduates of mechanical engineering schools commence their life work have undergone great changes during the past 10 years; the difficulty then

lies. These first two or three years are more a test of a man's character than of his technical abilities; if he does not possess the requisite "grit" to overcome the tendency to dispondency, he will fail. The training these years give to a man's character is of the greatest value to him and to his employers, and the greater the difficulties that are encountered and overcome, the better the man. If he successfully passes through this period, he acquires a stability which will give him and his employers confidence; he will have had opportunity to see where his technical training could be advantageously applied when the occasion for applying it will be given him; he will have learned that success is dependent upon both the respect and good will of the men with whom he is associated in the shop; and, in all probability, he will have discovered the secret of controlling men.

All of this teaches the old doctrine, that a man to succeed in this world must have character as well as education, and any

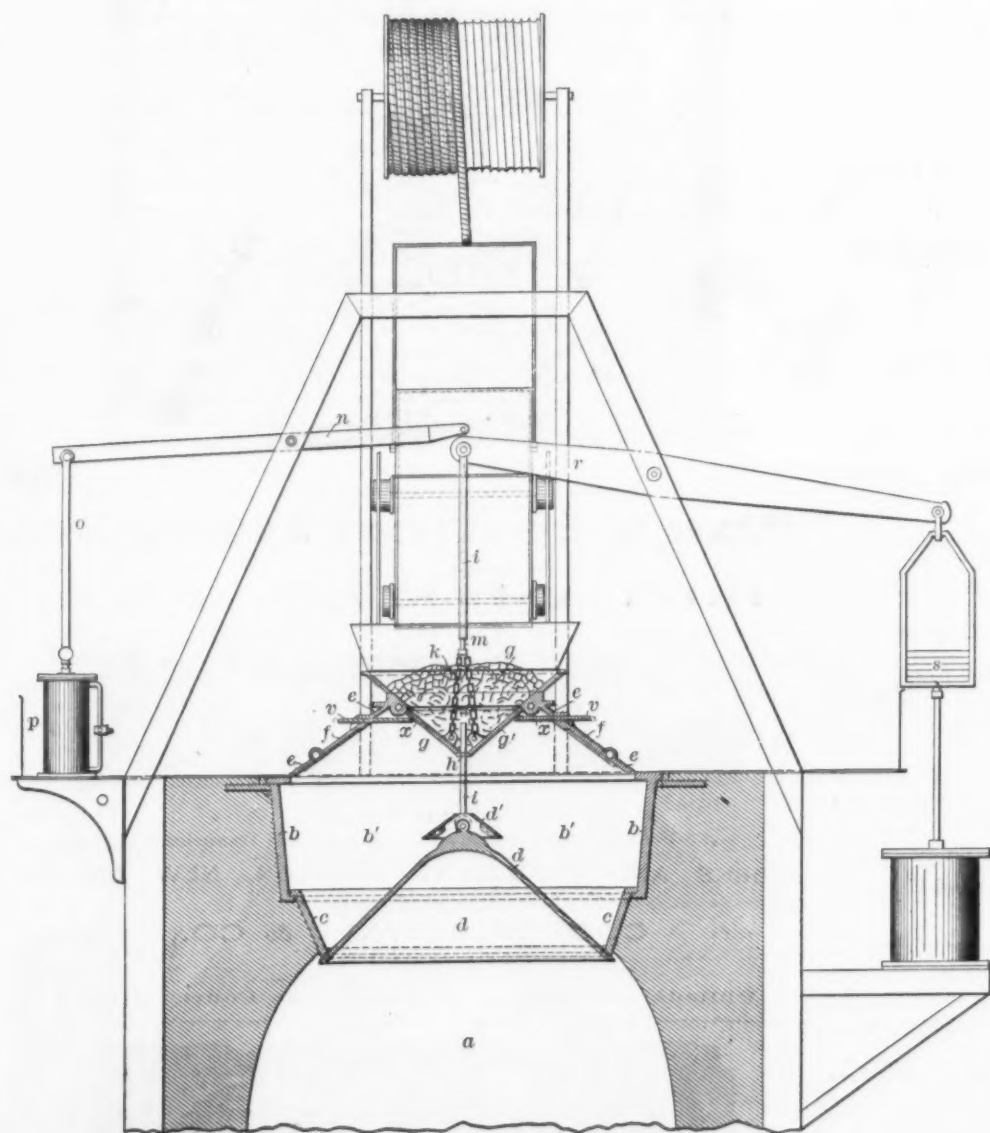


Fig. 1.—Elevation and Section of Furnace Top.

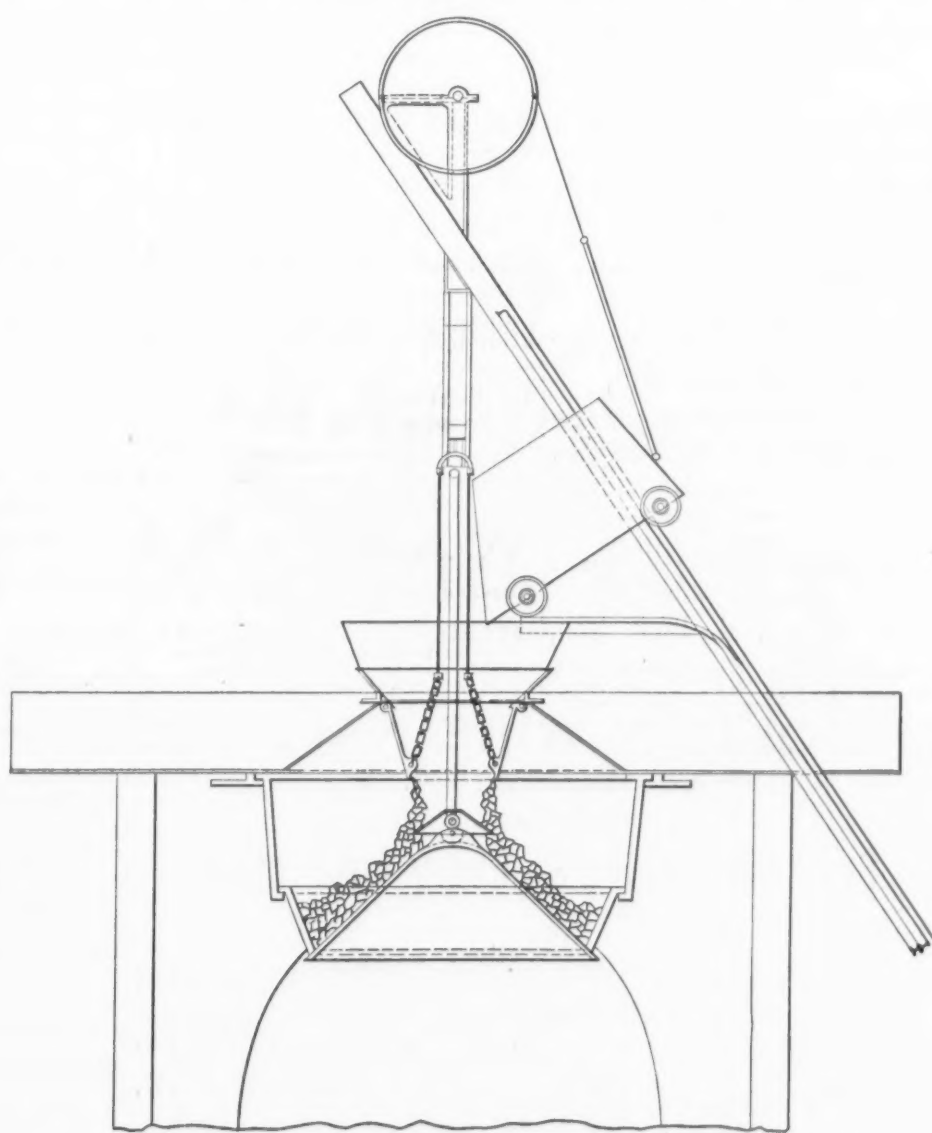


Fig. 2.—Side Elevation of Furnace Top, Showing Part of Inclined Furnace Hoist.

## THE KENNEDY & SCOTT FURNACE CHARGING APPARATUS AT THE LUCY FURNACES.

with materials at the following figures from Ontario ore, if the blast furnace owned mines in Ontario—viz.:

Mining magnetic Bessemer ore and putting on cars per ton	\$1.00
Royalty (per ton)	.50
Freight from mine to Buffalo (per ton)	1.50
Duty on Canadian ore entering U. S. (per ton)	.75
Cost of Ontario ore in Buffalo (including duty) (per ton)	3.75
One ton Bessemer ore as above (Magnetic)	3.75
.85 ton Gogebic Hematite ore at \$4, shipping port	2.90
Freight	1.10
Dock charges on transfer	.15
One ton coke at furnace	3.35

Total cost of fuel and ore in Buffalo..... 10.55  
As against \$13.14 in Duluth, \$13.92 in Cleveland and \$15.11 in Chicago.

If there was reciprocity between the United States and Canada the duty of 75 cents per ton on Canadian ore would be taken off, making the cost of ore and fuel in Buffalo \$9.80 by using magnetic Bessemer ore from Ontario. There would be a still further reduction if Ontario hematite was used to mix with the magnetic instead of Gogebic ore. We have some hematites which should be laid down in Buffalo very cheaply, but I am not prepared as yet to give particulars regarding them. But supposing magnetic Bessemer only could be obtained in Ontario for Buffalo furnaces, according to Mr. Birkinbine's figures your city would have a great advantage in making pig iron over other places. I have been told that the furnace which formerly operated in Buffalo was not successful, but surely this was owing to special circumstances which would not occur in a new undertaking now."

the method now in use at the Lucy Furnaces, Pittsburgh, Pa., has given good results, the principal features of which are shown in the accompanying details. It is the invention of W. Kennedy, superintendent of the Lucy Furnaces, Pittsburgh, and J. Scott. In order that these details may be readily understood, the following description is appended:

In Fig. 1 the furnace *a* is of the usual construction, having a metal casting *b* around the mouth. The usual hopper, *c*, supported in the mouth, and the usual bell, *d*, closing the mouth. Fastened to the casting *b* is an inclined tight circular metallic shell, *e*, which extends above the top and supports the upper hopper, *g*. The lower part of the hopper *g* is composed of four hinged doors or segments, *g*, which, where they meet at the center, are cut out so as to form a hole, *A*, for the passage of the rod, *i*, by which the bell, *d*, is suspended in the furnace. The inner end of the segments *g* are supported by chains, *K*, which hang from a common rod, *m*, connected with the pivoted lever *a*. The other end of the lever *a* is connected with the piston-rod *O* of the steam cylinder *p* or to a lever or other equivalent operating device, by which the lever *a* may be rocked or moved to raise or lower the segments *g* at pleasure, either from the furnace top, from the ground or other desirable place. The bell is operated by the rod *i*, lever *r*, counter balances *S* and cylinder *t*, or by other usual means. The shell *e* is provided with doors *f* back to the segmental doors *g*, by which access may be had back to the hopper chamber *b* when necessary. Thus constructed the operation is as follows:

at the top, is avoided. In case, for any cause, the furnace should bank up on one side, it can be cured by preventing the segment or segments on that side from swinging fully open by putting back of them the prop *x*, as shown at *V*. This causes the stock on that side to be shot over to the other side of the bell, and to collect there in greater quantity, so that when discharging into the furnace more of the charge will fall on the deficient side than of the banked-up side. This method adds but little to the cost of the top, and is simple and efficient in its operation. This arrangement has been in operation at the Lucy Furnaces for 20 months with very good results. No. 1 Furnace has made 75,000 tons of Bessemer iron in 12 months. No. 2 Furnace has made 115,000 tons, part Bessemer and part Mill, in 20 months. They were both working nicely late in July, with an output of 200 tons per day each in two weeks, after a 27 days' shut-down. No. 2 was also banked 28 days in February, 1886. Prior to the introduction of this arrangement the ordinary skip hoist was used, but the results were very unsatisfactory on account of imperfect distribution.

A large number of steel companies are experimenting with the employment of aluminium to produce sound castings. Among them are the Cleveland Rolling Mill Company, the Linden Steel Company, the Pittsburgh Steel Casting Company, the Otis Steel Company, the Alliance Works and the Chester Works. They use an alloy of iron and aluminium, manufactured at Lockport, N. Y., by the Cowles Electric Smelting and Aluminium Company, cast in thin slabs,

encountered by all technically educated men was that of reconciling theory to practice. Men of practical training only held almost all of the employing positions in mechanical industries, and there was with many of them an aversion to technically educated men. This was due to the deficiency of the technical education then given; to the mistaken idea of the great value of this education on the part of those who had received it, and to the ignorance and sentiment of some of the practical men. During the last 10 years a great reconciliation has taken place, and, as a result, we now find that the heads of many mechanical departments and industries are technically educated men; these men are anxious to surround themselves with others who have received the same training as themselves, so that now the difficulty which the young engineer encounters is not the old-time aversion to his education, but to prove that he really has secured the benefits of this education, and has sufficient strength of character to enable him to acquire the additional practical training, and to administer such affairs as may be delegated to him. The first two or three years after the young engineer graduates and goes into the workshop to acquire the practical knowledge requisite, together with the detail of the practice of the industry to which he has engaged himself, are, without doubt, exceeding hard and irksome; his habits of life are changed; he has to get up early in the mornings; the hours of labor are increased, and the time devoted to meals and recreation diminished; he has to comply with the rules, and in a large industry is very likely to receive but little attention from those in whose hands his advancement

graduate of a technical school can well afford a period of two or three years to gain and establish a character. Young engineers are apt to think that "technical knowledge is power," whereas, the maxim was never intended to be restricted to one kind of knowledge, and if they want to become thoroughly possessed of power they must have not only technical knowledge, but knowledge of their own and other men's characters, and the more this fact can be impressed upon them in training, the better it will be for them.

It is gratifying to know that many of the graduates of the Stevens Institute have successfully met these requirements; a very good evidence of this is given, for that portion of the graduates who have gone into mechanical departments of railroads, at the recent Burlington brake trials. These trials were so exhaustive that they required a number of technically educated assistants to make the observations and keep the records of the many different forms of apparatus that were used for recording the results. A large portion of these assistants were Stevens men, and that they successfully and faithfully performed their duties is shown by the character of the published reports. Very truly yours, EDWARD B. WALL.

Our Birmingham, Ala., correspondent writes: "The following is a recent analysis of what the chemists pronounce a 'strictly Bessemer ore, and very valuable': Peroxide iron, 83.30 per cent.; iron, 58.30 per cent.; phosphorus, 0.0266 per cent. The ore is from an entirely undeveloped property within 35 miles of Birmingham, not yet secured by any of the local iron concerns."



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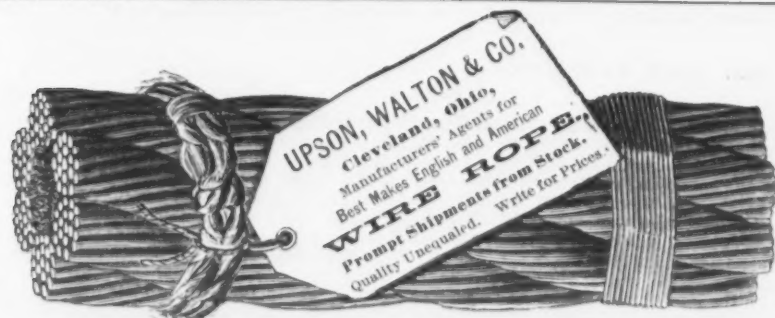
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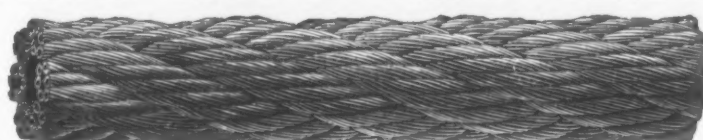
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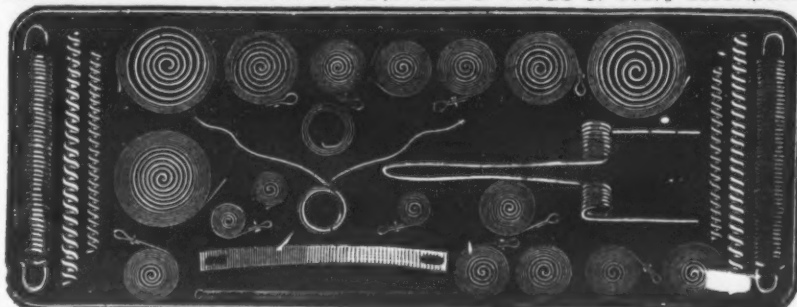
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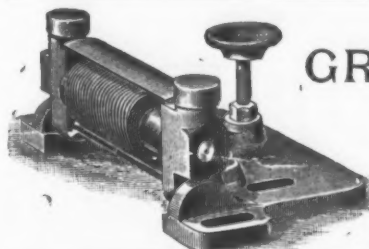
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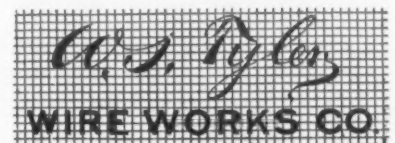


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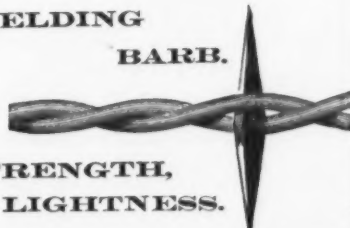
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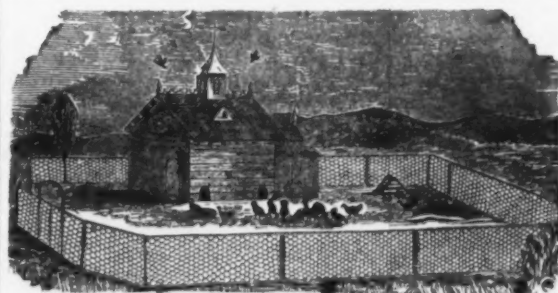
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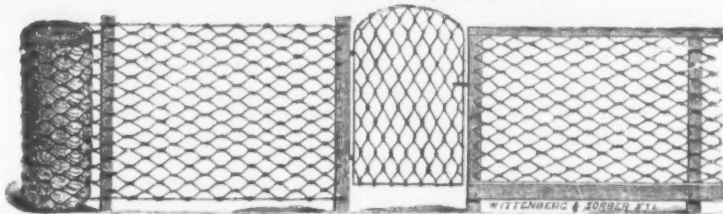


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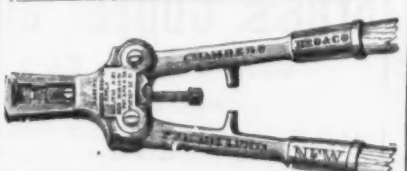
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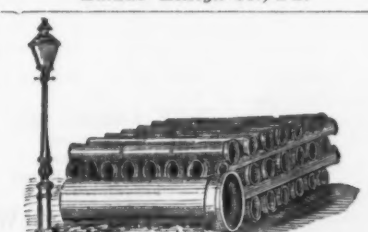
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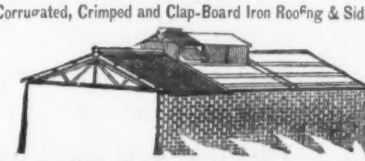
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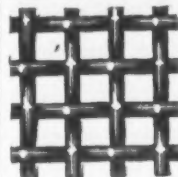
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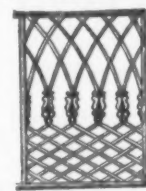
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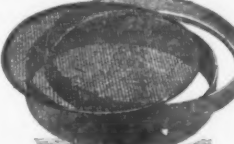
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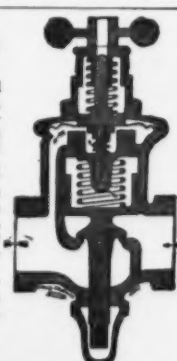


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 We are informed that various parties are infringing upon the widely-known Letters Patent granted originally to GEORGE F. WEYMOUTH for an improved Hay Knife. The invention patented to GEORGE F. WEYMOUTH is embodied in a sword-shaped blade provided with operating handles for working the same, the edge of the sword-blade being furnished with knife-edged serrations or teeth. It is our purpose to PROSECUTE ALL INFRINGEMENTS, and to hold responsible to the full extent of our ability and of the law all parties who manufacture any knife infringing upon the patent, or who deal in the same. Several suits are now pending in the U. S. Courts. All manufacturers and dealers are hereby warned of our rights, and the public are cautioned against purchasing any Hay Knives, made as described above, which are not of our genuine manufacture.  
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 PAT. APR. 29, 1884.  
 IMPROVED BY M.M. BARTLETT.  
 Improvement Patented April 25, 1885.

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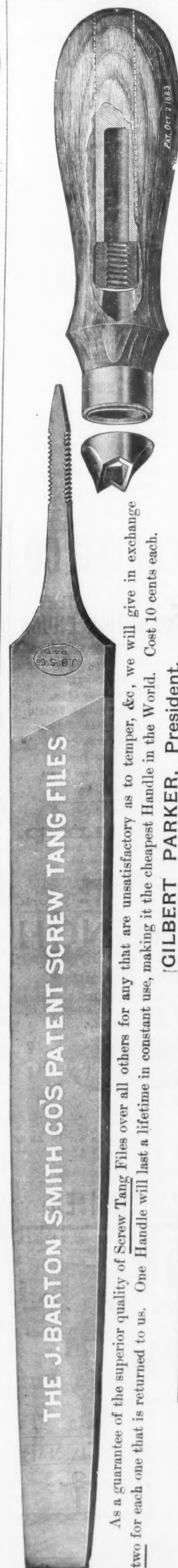
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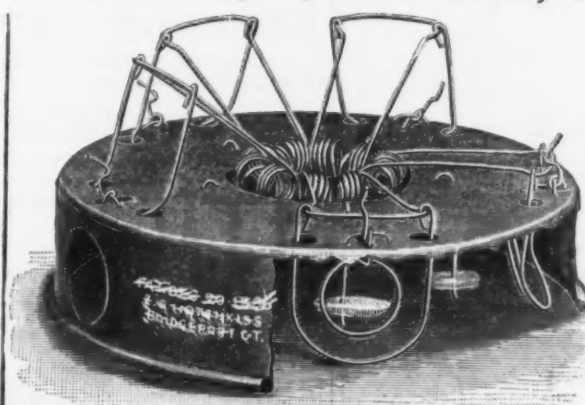
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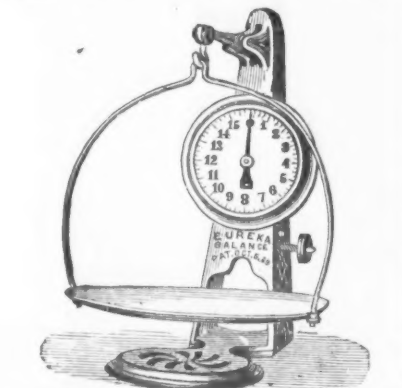
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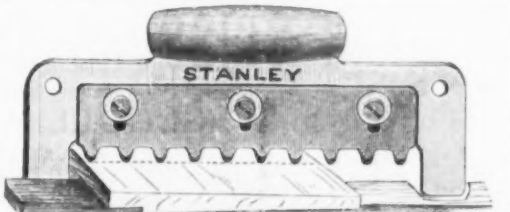
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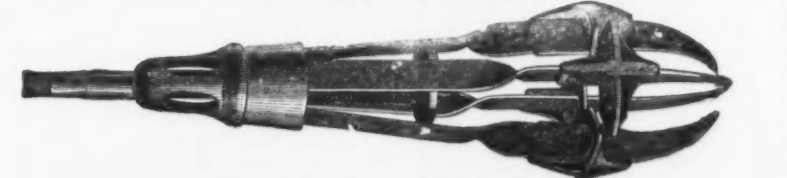
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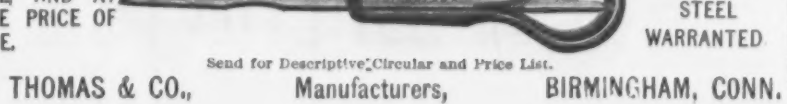
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## Foreign Markets.

(From Our English Correspondent.)

LONDON, August 15, 1887.

THE SITUATION

is not greatly different from what it was when last alluded to by me, but such variation as has taken place may be said to have been quite favorable. The dreary drought has been slightly relieved in some parts of the country by two or three cool days with good showers, but the earth is so parched that the not very bountiful rain fall has all been absorbed without any benefit accruing to the streams. In many places the water supply of the towns is being restricted to two or three hours daily, while in other places all water for manufacturing or business purposes has been cut off in order that human wants may be provided for as well possible under the circumstances. This stoppage is felt almost everywhere in England and Wales, but it appears to specially affect the tin plate works in Monmouthshire and South Wales, as those concerns are peculiarly dependent upon an adequate supply of water. I dwell upon these points in no mere meteorological spirit, but in order that your readers may exactly comprehend our position and grasp the bearings as they are likely to affect such articles as are most largely purchased by you from this country. If the drought should continue much longer its effects will certainly be considerable as regards the prices of tin plates, sheet iron and other manufactured products. Even now these grades of goods are decidedly better and firmer, while crude iron does not seem to undergo much movement. It would seem to follow, therefore, that the improvement is more a matter of restricted production than of unimagined demand—at home at all events. The foreign demand is proven by the Board of Trade returns to be well sustained; indeed, it is still our mainstay, hence it is pretty plain that the wants of the world are being very largely developed, if we admit the accuracy of the contention that the exports of Germany, Belgium, Sweden and Norway are all increasing concurrently with those of this country. At the same time the statistics amply prove that our home market is in a very poor condition indeed, and that it is absolutely necessary for us to make the most determined efforts to retain our hold upon the foreign and colonial markets. If we lose these we shall lose our mainstay—our all, in fact—and this, if I am rightly informed, would cause a fiscal struggle here to which the free trade agitation would be a mere piece of child's play.

has been decidedly cheerful, while the prospect is by many regarded as much more satisfactory. The crude iron trade shows less strength than it seemed to possess at the commencement of the half year, but, on the other hand, manufactured iron shows a steady development. The completion of the Tay Bridge, however, cannot but adversely affect those Scottish firms by whom the materials of this enormous structure have been furnished. The contractors for the bridge, every plate, girder, pillar, &c., being of malleable iron made in Lanarkshire. The margin of fluctuation in the several brands of Scotch pig has been unusually narrow, hardly amounting to more than a few pence. From Middlesboro' it is reported that inquiries have come to hand more freely, with the natural result of stiffening prices. During the remainder of the quarter sellers look for larger transactions and heavier shipments, and on this account makers are firm at 34/6 for No. 3 prompt. In this great center of production finished iron is being turned on a less scale than in other localities. Makers of galvanized corrugated sheets are still exceedingly busy, and £10. 2/6 @ £10. 5/ f.o.b. Liverpool is the ruling quotation. At some of the bar works a little more activity is apparent, and negotiations are being conducted with greater ease. Welch bars are quoted £4. 5/ @ £4. 7/6; Staffordshire, £5. 10/ @ £6; ditto nail rods, £5. 10/ @ £6; hoops, £5. 15/ @ £6. 5/; and sheets, £6. 10/ @ £7. 10/. Freighters show no material change. Chartering transactions outward are slow and prices depressed. Tees to New Orleans, 11/; rails prompt (Panama); Barrow to New Orleans, 9/6, 3000 tons pig iron, August-September (City of Manchester). At Cardiff the demand for tonnage is not so active as it was, and the rates to the Northern United States ports are now about 11/ @ 11/6, and to New Orleans, 12/. The leading manufacturers of crucible steel are said to be very busy, but for large castings for ordnance and engineering purposes there is less demand. The armor plate mills are well employed, and for ship plates there is an improved inquiry, owing to the increased activity in some of the northern shipbuilding yards. Quotations both for Bessemer and Siemens-Martin are unchanged. No new orders have come to hand in steel rails, but a good many inquiries have been made, and some important contracts are understood to be in process of negotiation. For standard sections £4. 2/6 @ £4. 7/6 still remains the current quotation. Jardine, Matheson & Co. are stated to have arranged another large contract with the Chinese Government. This time it is for about 6000 tons of steel rails for the railway extension to Taku and Tientsin. The rails are to be 60 lb and 70 lb weight to the yard, and the price agreed upon is 29.15 t/s. An order for 18,000 tons required by the Bengal and Nagpur Railway Company is understood to have gone to Bolckow, Vaughan & Co. (Limited), at about £4. 4/ @ ton, f.o.b. Middlesboro'.

**TIN PLATES.**  
In London this market is quiet, but very firm, on the basis of 13/3 @ 13/9 for ordinary IC cokes, f.o.b. Liverpool. The general scarcity of water and the stoppage of a few of the works have given a stronger tone to the market, and the majority of the makers maintain a very firm front. At Liverpool the market is fairly steady, though it must be admitted that not anything like the quantities quoted for have been booked. The inquiries run for the

most part on coke tin plates as well as Bessemer and Siemens steel plates, with coke finish. Some business has been done in ordinary kinds of coke tin plates at 12/9 @ 13/3, f.o.b. South Wales shipping ports. Bessemer steel cokes are sold as a rule from 12/10 1/2 to 13/6 IC, and Siemens steel plates, with coke finish, from 13/3 to 14/ IC. There is also a good demand for coke tin and Bessemer steel coke wasters at 12/ @ 12/6, but the latter figure is an exceptional one. In charcoal and best charcoal tin plates there has been a little doing. Prices range from 14/ to 15/6, Wales, for charcoals, and 16/ @ 17/ IC for best charcoals. Business in tines is quiet, and prices range between 12/ and 13/6 IC, with double the price for large sizes.

**FRANCE.**  
PARIS, August 20, 1887.—Metals.—A moderate demand has prevailed at steady figures, except for Tin, which is lower. We quote at the close in francs 100 kg.: Copper—Chili Bars, 105 @ 107.50; Inland and Slabs, 109.50; Best Selected, 111.50, and Pure Corocoro Ore, 108.25. Tin—Banco, 280; Biliton, 270.25; Straits, 270.25, and English, 270.25. Lead, 30.50 @ 31.25, and Spelter, 38.50 @ 39. Iron. Our market has been weak and irregular in consequence of the competition among dealers. Beams selling at 12.50 and Merchant Iron at 13.50, while Old Rails are bringing 8 francs—all 100 kg. At St. Dizier the moderate current demand suffices to absorb the output, Coke Merchant being worth 13.50, mixed 14.50. No. 3 Foundry Pig is sustained with some difficulty at 15.30 @ 15.75. Valenciennes the demand has slackened once more, and the market is irregular since. Merchant is quoted 12 francs nominally; Common Sheets, 14.50; Boiler do., 17.50, and Steel do., 19 @ 19.50.—*Moniteur des Interests Maternels.*

**BELGIUM.**  
BRUSSELS, August 20, 1887.—Iron.—The Belgian market has remained firmly sustained, with the sole exception, perhaps, of Merchant, the demand for which has abated somewhat during the week. The price of Sheet Iron has been raised by common consent, and is willingly submitted to by consumers. The only complaint to be heard is from makers of rolling stock, freight cars in particular. All other branches are getting on satisfactorily. Pig Iron is remarkably firm; Athus is booked for his Forge Pig all the way to the close of the year. Luxembourg Foundry Pig is also disposed of for several months ahead. The Steel works of Belgium are filling a steady run of orders, which, though not large, keep them tolerably busy. The business in Steel Rails is not large; they remain steady, nevertheless, but more important contracts would have to be shaded. Axles and Hoops, on the other hand, leave a decent margin. Some locomotives and passenger cars are building for the Persian railways to be constructed.—*Moniteur Industriel.*

**GERMANY.**  
HAMBURG, Aug. 20, 1887.—Iron.—Activity in Rhenish-Westphalia has been on the increase daily, extending to nearly all departments, and prices still tending upward. The Pig Iron demand is swelling perceptibly; stocks are but little larger than they were in June. There is quite a pressure to secure Foreign Pig, which is selling to arrive all the way to December 1. Spiegel has continued to look up in response to the growing export demand. Foundry Pig has been improving, but slowly; Bessemer is wanted, and higher. As Luxembourg Pig competes a good deal with Westphalian, it should be mentioned that one of the leading Luxembourg makers who had been holding aloof from the syndicate there has now joined it. Spiegel with 10 to 12 per cent. Manganese, all bringing 50 @ 51 marks 1/2 ton. In the rolling mill branch there has been uninterrupted animation, and at remunerative figures. Larger amounts of finished iron would perhaps have been taken if the common selling office of the syndicate did not exist and had not exercised some restraint by the higher prices fixed, but in this there is going to be a change after stocks in second and consumers' hands shall have been exhausted. It should be remarked that the position of Finished Iron would be stronger if the Sarrre makers had not so far declined to join the Westphalian and Silesian syndicates. Structural Iron is moving off satisfactorily; this may also be said of boiler and all course sheets, and about thin Sheet Silesian and Westphalian have agreed and raised the price to 135 marks 1/2 ton. Railway material might be more active. Both foundries and machine shops have booked more orders during the week than heretofore. Steel Billets may be quoted 112 @ 113; Wire Rods, 108 @ 110; Steel Rails, 110 @ 113. In Upper Silesia the demand for Pig Iron outruns the capacity of output, and Forge Pig, which a short time since did not bring over 48 marks 1/2 ton, is now wanted at 58; it is expected soon to come to 60. Finished has improved 10 marks 1/2 ton under a most active demand. Great liveliness is noticeable in the Silesian and Wire branch, with a strong rising tendency. The Rhenish Sheet works at Ruhrort have declared an 11 s dividend after writing off more liberally. Metals.—Lead is more neglected and weaker, Spelter steady. Copper less inquired for.—*BorsenKalle.*

**SPAIN.**  
BILBAO, August 12, 1887.—Iron Ore.—A brisk demand having set in for England, Germany and France, the market has taken an upward turn. Campanil being done as high as 7/3, while Rubios Superiores have also been improving and with ease are bringing 6/7 @ 6/10, available Ore being scarce, and the mine owners perceiving that a good demand is setting in for delivery in 1888. Numbers of steamers are ready to load and are rapidly being dispatched at all the drops, except those at the Triana Railway terminus, where a culpable delay still exists merely because the managers do not wish to pay the wages which would increase the number of hands and which at other points are readily allowed, the result being that shippers have to pay damages which they ought not to be liable to. Shipments to date, 2,772,905 tons, against 2,085,943 same time last year. Pig Iron—Has been sluggish, both for export and home use.—*Bilbao Maritimo y Comercial.*

**BRAZIL.**  
PARA, July 23, 1887.—India Rubber.—During the first six months there were reported from the Province of Para altogether 6891 tons of India Rubber, of which 2810 tons were shipped to Liverpool; 390 to Havre, and 3232 to New York. The India Rubber crop during the fiscal year 1886-87 amounted to 13,394 tons, being 320 tons greater than the one of the preceding year. The principal shippers so far this year were: E. Schramm & Co., Barros & Vianna, La Roche de Costa & Co., H. A. Gould & Co., the Nova Companhia Uniao, Goncalves, Sampaio & Co., R. F. Sars & Co., J. A. Soares & Co., Denis, Cronan & Co., Stieglitz, Brocklehurst & Co., Martin & Co. and W. Brambeer & Co.—*O. Commercio.*

**CHILI.**  
VALPARAISO, June 24, 1887.—Copper.—Under the impulse of better cable advices from England an improved demand sprang up, but the rise in exchange prevented much being done, total sales footing up 8770 quintals at \$15.70 @ \$15.80, the latter figure equaling \$40. 1/5, with 27 1/2 freight; the available supply has run quite low. Nitrate of Soda.—Has been dull and lower, sales not exceeding 315,000 quintals at \$2.60 for 95%, which equals 7/104. Charters effected for Europe amounted to 41,000 tons, and for the United States to 5000. Coal.—While spot and near-by coal has been firm; the more distant affords have been weak, and we quote Newcastle, West Hartley February-March shipment 30/; Arrol, in port, 28/; and Australian 22/ 1/2 ton. Exchange—90 days' sight on London, 25 1/2 d.—*Weber & Co.*

**EAST INDIES.**  
SINGAPORE, August 29, 1887.—Tin.—The settlements have been small; in sympathy with London, a decline in value has taken place, and buyers now offer only \$37.50 1/2 picul. Large supplies are talked about but so far have not appeared. Tonnage.—Rates for London are 3/6 for weight. For New York the Feliciano, Antonio P. has not yet arrived, and there is still a great want of tonnage. For Boston there is no fresh call to report. Exchange is firm at 2/2 1/2 for six months sight credits. For New York the steamer Gulf of Venice took from Penang 224 piculs, the Telemachus 841, and the Lachsen from here 222.—*Gilman, Wood & Co.*







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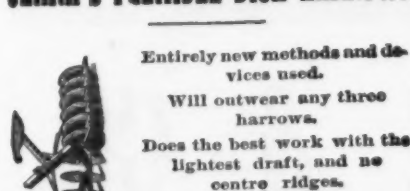
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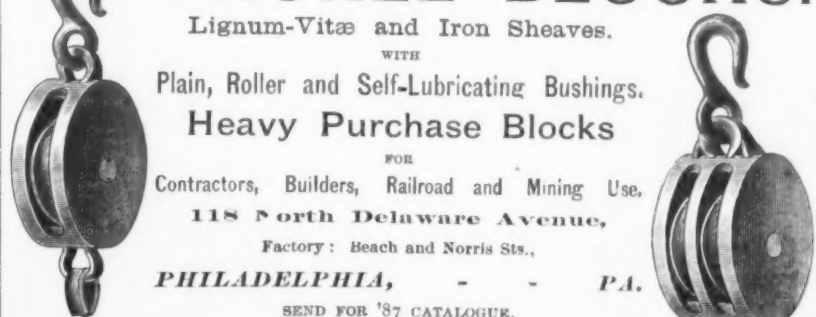
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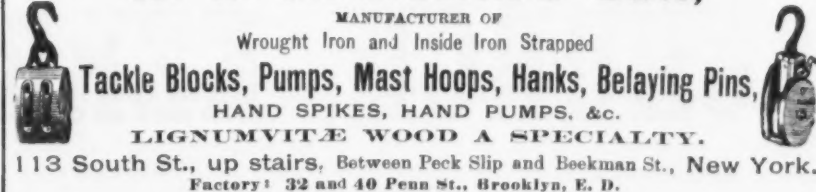
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## Our Future Timber Supply.

Prof. Charles S. Sargent, one of the special agents of the tenth census, in his report on the forests of North America, gives it as his opinion that the forests of the United States, notwithstanding the great and increasing drains upon them, are capable of yielding annually, for many years longer, a larger amount of material than has yet been drawn from them, even with our present reckless methods of forest management. It is true that the great pine forest of the North has already suffered fatal inroads, that the pine that once covered New England and New York has disappeared, and that Pennsylvania is nearly stripped of what once appeared to be a nearly inexhaustible supply of the same wood. But the great Northwestern pineries are not yet exhausted, and, with the newly introduced methods by which logs once supposed inaccessible are now profitably brought to the mills, they may be expected to increase the volume of their annual product for a few years longer in response to the growing demands of the great agricultural population which is fast covering the treeless mid-continental plateau.

The area of the pine forest, however, remaining in the great pine-producing States of Michigan, Wisconsin and Minnesota, is dangerously small in proportion to the country's consumption of white pine lumber, and the entire exhaustion of these forests in a comparatively short time is certain. The wide area now covered in New England by a vigorous second growth of white pine, although insignificant in growth and productiveness in comparison with the forests that it replaces, must not be overlooked in considering the pine supply of the country. These new forests which are already yielding between 200 and 300 million feet of timber annually, are capable of great future development.

The pine belt of the South Atlantic region still contains immense quantities of timber unequalled for all purposes of construction, although unsuited to take the place of the white pine of the north. The Southern pine forests, although stripped from the banks of streams flowing into the Atlantic, are practically untouched in the Gulf States, especially in those bordering the Mississippi River. These forests contain sufficient material to supply all possible demands that can be made upon them for a long time.

The hardwood forests of the Mississippi basin are still, in certain regions at least, important, although the best walnut, ash, cherry, and yellow poplar have been largely culled. Two great bodies of hardwood timber, however, remain, and upon these comparatively slight inroads have been made as yet. The most important of these forests covers the region occupied by the Southern Allegheny mountain system, embracing Southwestern Virginia, West Virginia, Western North and South Carolina, and Eastern Kentucky and Tennessee. Here oak unequalled in quality abounds, walnut is still not rare, although not found in any very large continuous bodies, and cherry, yellow poplar, and other woods of commercial importance are common. The second great body of hardwood, largely oak, is found west of the Mississippi River, extending from Central Missouri to Western Louisiana. The forests of Michigan, especially those of the northern peninsula, still abound in considerable bodies of hardwood, principally maple. Throughout the remainder of the Atlantic region the hardwood forests, although often covering considerable areas, have everywhere lost their best timber, and are either entirely insufficient to supply the local demand of the present population, or must soon become so.

In the Pacific region the great forests of fir which extend along the coast region of Washington Territory and Oregon are still practically intact. Fire and the axe have scarcely made a perceptible impression upon this magnificent accumulation of timber. Great forests of pine still cover the California Sierras through nearly their entire extent. The redwood forest of the coast, however, once, all things considered, the most important and valuable body of timber in the United States, has already suffered seriously, and many of its best and most accessible trees have been removed. This forest still contains a large amount of timber, although its extent and productive capacity have been generally exaggerated. The demand for redwood, the only real substitute for white pine produced in the forests of the United States, is rapidly increasing, and, even at the present rate of consumption, the commercial importance of this forest must soon disappear.

The pine forests that cover the western slopes of the northern Rocky Mountains and those occupying the high plateau and inaccessible mountain ranges of central Arizona and southwestern New Mexico have not yet suffered serious damage at the hands of man. The remaining forests of the Pacific region, of little beyond local importance, are fast disappearing. The area of these interior forests is diminished every year by fire and by the demands of a careless and indifferent population, and there complete extermination is probably inevitable.

The forest wealth of the country is still undoubtedly enormous. Great as it is, however, it is not inexhaustible, and the forests of the United States, in spite of their extent, variety and richness, in spite of the fact that the climatic conditions of a large portion of the country are peculiarly favorable to the development of forest growth, cannot always continue productive if the simplest laws of nature governing their growth are totally disregarded.

The judicious cutting of a forest in a climate like that of the Atlantic or Pacific coast regions entails no serious or permanent loss. A crop ready for the harvest is gathered for the benefit of the community; trees that have reached their prime are cut, instead of being allowed to perish naturally, and others take their place. The permanence of the forests in regions better suited for the growth of trees than for general agriculture may thus be insured. Two causes, however, are constantly at work destroying the permanence of the forests of the country, and threatening their total extermination as sources of national pro-

perity—fire and browsing animals inflict greater permanent injury upon the forests of the country than the axe, recklessly and wastefully as it is generally used against them.

## The Chicago Cast-Iron Pipe Trade.

The demand for cast-iron gas and water pipe has been unusually large this year in Chicago and its vicinity. This is ascribed to two causes—first, the very active condition of almost all kinds of business, which would naturally carry this branch of the iron trade along sympathetically, and, second, the rapid growth of the city and its suburbs, requiring an extension of the gas and water supply to meet the requirements of people scattered over a larger territory. The pipe-laying season begins when the frost is out of the ground, and continues until operations are suspended by cold weather. Comparing the present season with its predecessor, the demand has been much better, and prices have been higher. Corresponding sizes are now from \$8 to \$10 per ton higher than at the beginning of last season, although they have practically not advanced this year, the prices ruling now being those obtained toward the close of last season. Large contracts are still coming on the market for this year's requirements, and the outlook is not only excellent for the remainder of the season, but it is also highly probable that enough work will lap over into next year to give it a strong impulse and insure a continuance of activity.

The Chicago pipe trade is supplied entirely by works located elsewhere, St. Louis and Louisville probably controlling the greater part of it. Detroit, Cleveland and Newport, Ky., pipe foundries also participate in the business arising at Chicago, and even foundries as far east as Reading, Pa., and Phillipsburg, N. J., secure some of it. The demand on all available sources of supply is now so great that deliveries are much in arrears. Several years ago a pipe foundry was established in Chicago, but it was in advance of the needs of that section, and after a comparatively brief, but very expensive, career it was obliged to suspend operations. The present condition of the trade would almost seem to warrant another attempt in this line, as the chances of success are bright for a well-equipped and well-managed works.

A peculiar feature of the existing demand for cast-iron pipe is that much of it comes from owners of acre property in the suburbs or from real estate operators who are putting up for sale subdivisions of suburban property. By providing gas and water connections, and even sewer connections, these land dealers are able to more readily dispose of lots to individual buyers, and they also save at least part of the cost of assessments for improvements by the city authorities. Suburban residents of Chicago, as well as of Eastern cities, now demand conveniences in their domestic arrangements, and land operators find it necessary to minister to their wants. This is also true of outlying Western towns, which are not suburbs of large cities. Their residents are striving to enjoy city comforts and conveniences, all of which involve the use of more or less cast-iron pipe. Brokers and agents are very busy in not only attending to the current demand, but in making estimates for suburbs and country towns, much of which will undoubtedly materialize unless the country is meanwhile overtaken by a widespread financial disturbance which would affect the pipe trade as well as all other branches of the iron trade.

Assistant Secretary of the Treasury Maynard has received several protests from New York importers against his recent ruling in the case of Naylor & Co., in which he stated that the Department found it difficult to understand how merchandise which is transported by freight can arrive in advance of consular invoices, which come by mail, even though the invoices are mailed from the Continent via London. Mr. Maynard's attention has been called to the fact that merchandise shipped from England by a fast steamer of a foreign line may, and often does, arrive in the United States before the bill of lading and invoice, which under English law can only be sent by mail in an English steamer. Similar conditions may attend the exportation of goods from Germany. It seems that in such cases *pro forma* invoices ought to be allowed. The difficulty is that Attorney-General Devens decided, October 4, 1878, that the penalty of 20 per cent. additional duty for undervaluations in excess of 10 per cent. did not apply to importations made upon *pro forma* invoices. The remedy would seem to lie in subjecting entries under *pro forma* invoices to the same penalties for undervaluation which are attached to entries under consular invoices.

The people of Fostoria, Ohio, which is situated in the natural gas belt near Findlay, are offering strong inducements to manufacturers to locate there. A gas belt line, with 6 inch mains, has recently been completed around the town, opening up to manufacturers a large area available for factory sites. Although this line cost about \$50,000, the city guarantees free gas as well as free land to those who choose to take advantage of the opportunity presented. The railroad facilities are excellent, no less than five roads having direct connection with this point. The manufacturing establishments located there thus far are quite numerous and some of them are of considerable importance, but only a few of them are directly connected with any branch of the iron trade. The new establishments now being erected comprise planing mills, stove works, railroad torpedoes, a carriage factory and two glass factories.

Several tons of gun metal have been sent to the torpedo station at Newport, that its power of resistance to shocks from gun cotton explosions may be tested in a series of experiments.

At the Louisville and Nashville Railroad Company's yards, at New Albany, successful experiments have recently been made with the automatic car coupler invented by James R. Avery, of Louisville, Ky.



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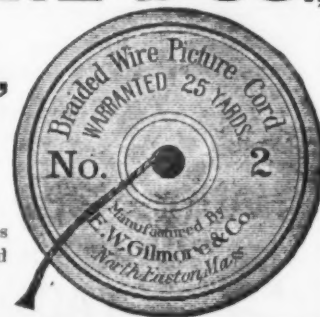
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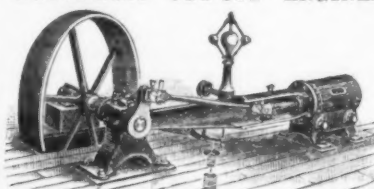
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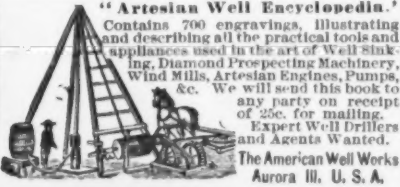
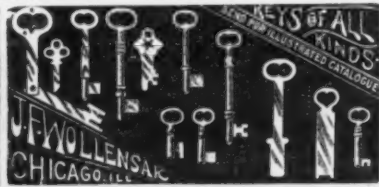


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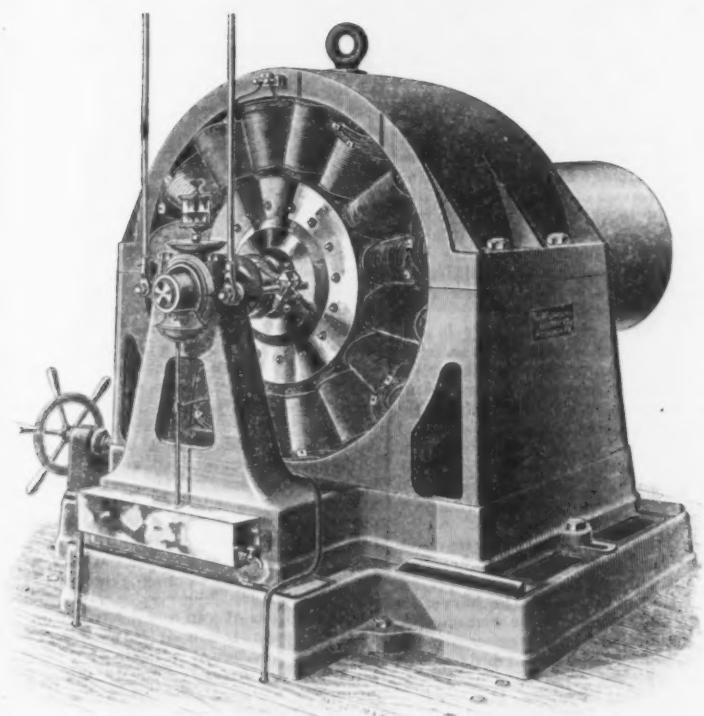


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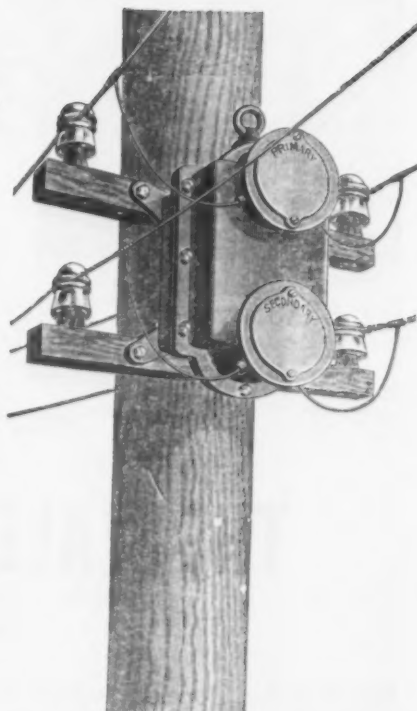
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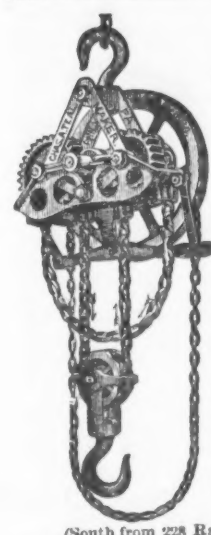
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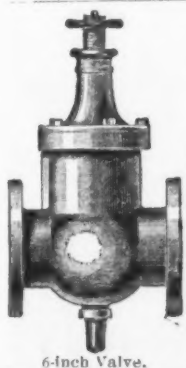




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Portable Hoist,  
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hoist is built.  
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idly raising or low-  
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stead of the slow and  
tedious process by  
the hand chain.  
4th. Being provided  
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which adds both to  
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the life of the hoist.  
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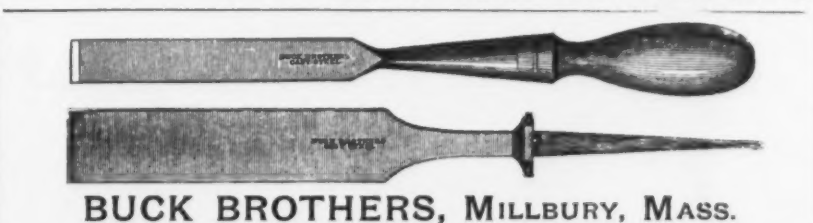
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The Most Complete Assortment in the U. S. of  
Shank, Socket Firmer and Socket Framing Chisels.  
**PLANE IRONS.**  
CAUTION.—Buyers should be on their guard and not have inferior goods passed on them by unprincipled  
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**Machinery of the Forth Bridge Works.**

The greater part of the machinery at the  
Forth Bridge Works, Scotland, is original in  
design and novel in construction, chiefly  
because of the unusual nature of the work to  
be carried out. Mr. William Arrol, in a  
paper on the subject, recently read before  
the British Institution of Mechanical Engi-  
neers, roughly classed it under the follow-  
ing heads: hydraulic bending and setting,  
planing, drilling, erecting and riveting  
machinery. In designing the machinery  
and tools to accomplish these different kinds  
of work, there had ever to be kept in view  
rapidity of production, with a very high  
quality of work in the finished structure.  
An idea of the quantity of machinery pro-  
vided to deal with the material passing  
through the shops may be partly formed  
from the fact that it is capable of finishing  
1500 tons in a single month. Of the details  
of the machinery we take the following from  
Mr. Arrol's paper:

**Hydraulic Bending and Setting Machinery.**  
—To bend and twist the large steel plates  
required in the construction of the tubes and  
their connections, a great variety of hy-  
draulic presses had to be provided. The  
largest of these is capable of exerting a  
pressure of 1600 tons between the dies. It  
consists of four 24-inch cylinders, resting on  
two longitudinal girders bedded in concrete.  
From each cylinder rise two iron columns,  
which carry a fixed table overhead. On  
the top of the rams another table is placed,  
which can be raised or lowered at will.  
Between these two tables are placed the  
blocks which stamp the plates to the desired  
shape. In most cases this shape is the arc of  
a circle, but in others the form is very vary-  
ing, while in some instances the plates are  
flanged as well as bent or twisted. In  
nearly every case, after a plate has been set  
while heated, it requires to be finally ad-  
justed when cooled. To dispense with the  
heating of the plates gives unsatisfactory  
work, and in many cases impossible. In  
no instance is this plan of bending adopted  
to any extent without annealing the plates  
both before and after the work has been put  
upon them. Much of the final adjusting of  
the plates is done by presses consisting of a  
simple ram fixed to the upper of two girders,  
which are bound together at the ends, the  
lower girder serving as the seat for the block  
on which the plate is placed. Numerous  
other forms of presses are employed for  
lighter work.

**Planing Machinery.**—A special class of ma-  
chinery is employed to plane the edges of the  
plates. In the case of most of the plates this  
requires to be done very carefully, because  
in the structure of the bridge a certain per-  
centage of the stress in compression is taken  
up by the plates butting, instead of wholly  
by the rivets as in the tension joints. This  
statement applies to all plates in the tubes.  
The sides are first planed on what may be  
looked upon as an ordinary planing machine.  
It is provided, however, with special double  
side cheeks, between which are two fixed  
swiveling tool boxes, one on each side of  
the machine. These tool boxes can, when  
desired, be transferred to a special cross  
slide, as it is sometimes more convenient to  
work with one box in the cross slide rather  
than with both between the side cheeks.  
Both tools act together and cut continuously  
—that is, during the backward as well as  
the forward travel of the table. The plate  
to be cut is fixed upon a curved block, which  
in turn is securedly bolted to the table.

For planing the ends of the curved plates  
a special machine had to be designed and  
built, in which the plates are secured to a  
fixed table, while the tool is made to travel  
backward and forward in a swinging pen-  
dulum that receives its motion through a  
connecting-rod from a traveling saddle. The  
tool cuts both ways in this instance also, and  
is fed to its work by hand.  
The planing machines employed to finish  
the rectangular plates for girder work are  
of the usual pattern for plate edge planing,  
but with the addition of an end slide pro-  
vided with a separate tool for planing one end  
of the plate at the same time that one of its  
sides is being similarly treated. This ma-  
chine finishes a plate at two settings, with  
the certainty that the ends are at right  
angles to the sides.

In some machines two saddles are upon  
the main slide, and in others two tools are  
in one saddle; both devices have their ad-  
vantages. The facing of the tees, angles  
and other sections is done as a rule by cold  
steel saws, in order to secure good butting.  
**Drilling Machinery.**—As will be inferred  
from the varying character of the work, the  
drilling is performed by various classes of  
machines. The principle kept in view is  
that, wherever possible, girders, tubes, &c.,  
should be drilled only while their various  
parts are temporarily built and held together  
by bolts in the position they will finally  
occupy in the finished structure; in this way  
the highest class of work is obtained.

For drilling the tubes, the machines, each  
complete in itself, are made large enough to  
embrace the entire circumference of the  
tube. They consist of a wrought iron under-  
frame or carriage, on which are placed the  
engine and boiler. On it are also fixed two  
large cast iron annular rings or headstocks,  
embracing the tube, round which 10 drilling  
slides and heads travel circumferentially.  
The slides are moved around the rings and  
consequently around the tubes by a worm at  
each end, gearing into a worm-wheel that  
forms part of the rings. The motion of the  
drill-heads on the slides is longitudinal, or  
parallel to the tubes. These two motions  
easily permit of the 10 drills working at any  
part of the circumference of the tube com-  
prised between the two annular rings, which  
embrace a length of 8 feet. When this  
length is finished, the whole machine is  
traveled forward, and is again ready to  
drill a new length of 8 feet. The tube  
rests on timber blocks, which are removed  
from the front and placed behind as the ma-  
chine travels forward. In the case of the  
lighter tubes, the rate of drilling is as high  
as 12 lineal feet of tube per shift of 10  
hours; this represents about 800 holes  
drilled.

The booms of all girders are drilled sepa-  
rately on blocks, thus leaving the bracings to  
be drilled to template, which is done by  
radial drills at another time. The machines  
employed to drill the booms are of a wholly

different kind from those used for the tubes.  
They are moved along rails, running on each  
side of the blocks upon which the booms are  
built, and parallel with them. They consist  
of a double carriage with upright columns,  
connected together by means of a cross-beam  
and sundry other framing for carrying the  
shafts, pulleys, &c. To the columns and  
cross-beams are secured slides, to which the  
fixed drill-heads are bolted on the front of  
the machine; while to the back are attached  
radiating arms, each carrying a single drill.  
In this way there are both fixed and swing-  
ing drills on the two sides of the machine,  
capable of drilling holes in either a horizon-  
tal or a vertical plane. The fixed drills  
serve for all holes in the regular pitch, while  
the movable drills take what may be called  
odd holes, such as those where the struts  
and ties are to be secured to the booms. All  
the fixed drills are self feeding, but the  
movable ones are fed by hand. The number  
of drills simultaneously at work varies  
greatly; at times as many as thirteen have  
been employed together on a single boom.

Other machines having radials with only  
single drills are used for a special class of drill-  
ing and are found to work to great advantage.  
With the exception of a few special tools,  
all the remaining drilling is done by radials  
capable of making a complete circle round  
the column on which they are supported.  
Tables are placed on each side of these ma-  
chines, and the work is fixed on one of the  
tables; and as the drills are placed at a con-  
venient distance from one another, all the  
drilling required is easily accomplished with-  
out a second shifting of the work.

**Erecting and Riveting Machinery.**—To  
erect and rivet such large quantities of ma-  
terial at the immense height at which much  
of it requires to be done demands a large  
quantity of special plant for riveting and  
other purposes. The ordinary class of rivet-  
ing is accomplished by means of small port-  
able riveters, consisting of two arms held  
apart by links and stays; one arm acts as  
the holder on, while the other carries the  
hydraulic cylinder for supplying the power,  
the cylinder and arm together forming one  
casting. For some of the more difficult  
work, where neither could this form of  
riveter be employed, nor could the work be  
done by hand, small direct-acting hydraulic  
cylinders were used; the die for forming the  
rivet-head was here fixed into the piston.  
Two 4-inch cylinders were usually employed,  
held to their work either by hard-wood  
packing placed against the permanent  
structure, or by temporary girders brought  
into proper position. In these machines the  
pressure employed was 3 tons per square  
inch. A large amount of excellent work  
was performed by these machines in posi-  
tions where it was practically impossible to  
do it otherwise.

The riveting of the vertical columns of the  
piers is done by riveting machines attached  
to the under sides of the lifting platforms.  
They are lifted with the platforms, and do  
their work while the platform is at rest.  
They consist of two longitudinal girders or  
uprights, one on the outside and the other the  
inside of the column. Along the face of each  
girder a riveting cylinder is raised or lowered  
by hydraulic power. The inside girder has  
a trunnion at top and bottom, fitting into a  
step in two temporary diaphragms for sup-  
porting the thrust of the rams in riveting.  
It is turned round on the trunnions at will,  
so as to rivet up an entire length of 16 feet  
of the tube both circumferentially and longi-  
tudinally. The outside girder and riveting  
cylinder when at work always face the in-  
side. The outside girder is attached top and  
bottom to two wrought-iron rings, which  
encircle the column, and not only furnish  
the necessary support but also permit of the  
machine being moved round the column by  
hydraulic power as required. Over 800  
rivets have been closed in a day by one of  
these machines.

In the erection of the large piers of the  
bridge, hydraulic power is utilized to a great  
extent. The principle adopted is to build  
the piers from off a platform raised by  
hydraulic pressure as the work of erection  
proceeds, utilizing the piers themselves in  
process of building as the support of the ris-  
ing platform.

**Solidification by Pressure.**—Accord-  
ing to *Engineering*, M. Amagat has succeeded  
in solidifying various liquids, by compress-  
ing them in cylinders of bronze and steel.  
He has also photographed the crystals after  
crystallization, by means of a ray of electric  
light traversing the interior of the vessel by  
glass cones serving as lenses. The stages of  
crystallization can be observed in this way  
with chloride of carbon, and it is seen that  
the process varies with the rapidity with  
which the pressure is produced. If rapidly,  
a sudden circle of crystals gathers round  
the edge of the luminous field, and grows to  
the center. The pressure being continued,  
the field becomes obscure, then transparent.  
As the pressure is diminished the reverse  
takes place, and the liquid state is repro-  
duced. M. Amagat finds that chloride of  
carbon solidifies at 19.5° C. under a pressure  
of 210 atmospheres. At 22° C. benzine  
crystallizes with a pressure of about 900 at-  
mospheres.

The Kansas City and Sabine Pass Railway  
Company have filed articles of incorporation  
and received a charter for the State of  
Missouri, with a capital of \$2,500,000. Har-  
rison M. James, of New York, is president,  
and Fred M. Day, of Brooklyn, treasurer.  
The object is to build an air-line from Kan-  
sas City to Sabine Pass, a distance of 700  
miles, being the nearest coast point to the  
former city by 400 miles. Connections will  
be made with northern roads, giving an air-  
line from Duluth through St. Paul, Des  
Moines, Kansas City, Fort Smith, Texar-  
cana and Sabine Pass. The right of way  
has been obtained for the greater part of the  
way, and terminal facilities have been  
secured in Kansas City. Track laying will  
begin September 15.

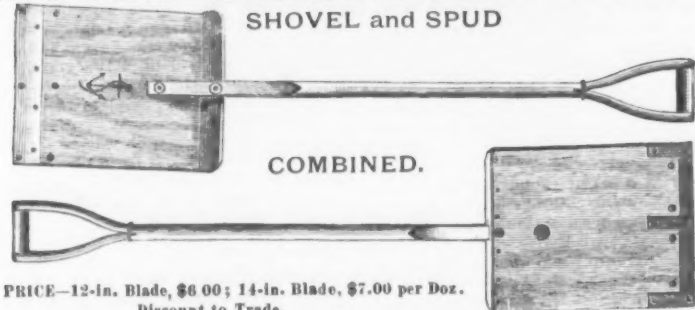
The newly appointed chief appraiser in  
the Boston Custom-House is Henry P. Kit-  
field, a native of Charlestown, Mass., lately  
assistant appraiser, and formerly of the firm  
of Henry Kittfield & Sons, in the leather  
business.



**THE ARMSTRONG MFG CO. WATER, GAS & STEAM FITTERS TOOLS**  
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SHOVEL and SPUD



PRICE—12-in. Blade, \$6.00; 14-in. Blade, \$7.00 per Doz.  
Discount to Trade.  
DESCRIPTION.—Blades of first-class Basswood, size 12x15 1/4 inches and 14x16 1/4 inches; Handles and Heads selected hardwood, standard length, 3 1/2 feet; pointed with 1 3/4 inches steel, secured by rivets and three runner braces on back. Note the Band at bottom of D on handle, to prevent splitting and to add extra strength. We claim the "Anchor" shovel the best in the market. Order early, as factory capacity is limited and "first come first served."  
**PENFIELD BLOCK COMPANY, Lockport, N. Y.**

The accompanying cut represents our four-pointed, painted or galvanized  
**BARB FENCE WIRE,**  
MANUFACTURED BY  
**OHIO STEEL BARB FENCE CO.**  
CLEVELAND, OHIO.  
Cut of our two-pointed wire will appear next week.  
CORRESPONDENCE SOLICITED

Prices Lowest. Quality Best.

**THE EMPIRE METAL SPIRIT LEVEL, WITH DOUBLE PLUMB.**  
Glasses are immovable. No Parts to Work Loose. Glasses Perfectly Protected. Made Entirely from One Piece.  
Patented Dec. 7, '86.  
WARRANTED CORRECT.  
The Most Durable, Simple in Construction and Cheapest Iron Level on the Market.  
Manufactured by **GREENE, TWEED & CO., 83 Chambers St. New York.**  
**NICKEL ROLLING CO., Lim.,**  
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DR. FLEITMANN'S PATENT.  
Manufacturers of Pure Nickel Sheets, Pure Nickel Wire, Iron Wire Coated with 20% Nickel and Iron Sheets Coated with 5 and 10% Pure Nickel (welded on) of different sizes and thickness.  
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Also Sole Agent of the Stolberg Co.'s Selected Lead and the well-known brand of S. S. Spelter

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Manufacturers of Wood Pumps, Tubing, &c.  
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**SOUTH BEND PUMP CO., So. Bend, Ind.**

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—AND—  
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**NEW PATTERN SMOOTH BACK COAL BARGE SCOOP.**



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For Water and Oil Packings Pump Valves, Carriage Axle Washers and General Purposes.

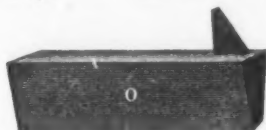
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**HOLLOW THIN BACK.**

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**NEW** pattern Heavy Screw Clamps.  
Strongest in the market.  
For sale by all the principal Hardware dealers.  
Send for Price List.

**MALLEABLE IRON CASTINGS**  
of superior quality and Hardware Specialties  
in Malleable Iron made to order.

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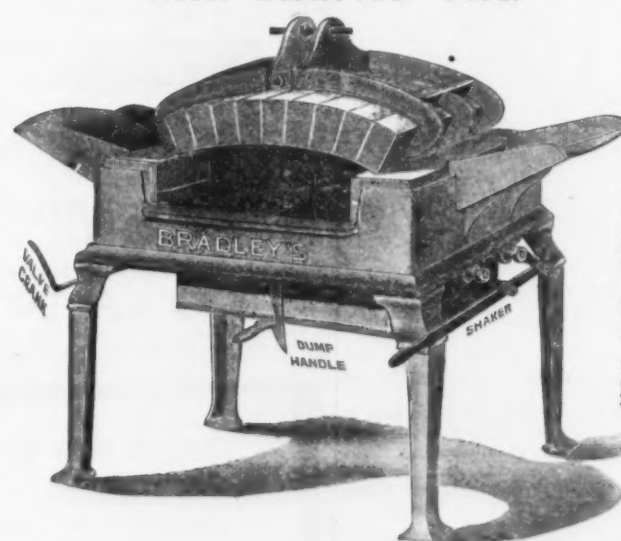
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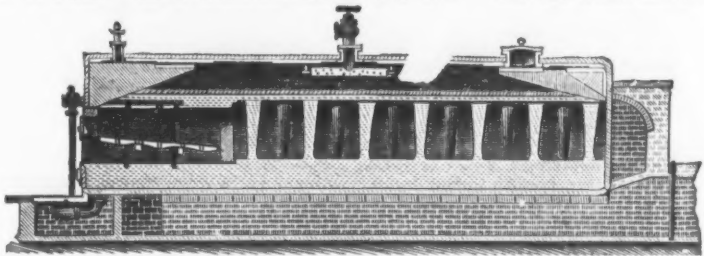
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## The Canadian Iron Duties.

The *Canadian Gazette* publishes the following certified copy of a report of a committee of the Privy Council of Canada, forming a reply to the representations forwarded by Her Majesty's Secretary of State for the Colonies on the subject of the recent advance in the duties upon iron and steel imported to Canada. This reply has been transmitted to the Secretary of State for the Colonies by the Governor-General of Canada. The Minister of Finance, to whom the papers were referred, has submitted the following memorandum respecting the recent changes made in the above-named duties to show how they affect the interests of the British Empire as compared with those of foreign countries. This memorandum, it is claimed, shows: That in the adjustment of the duties a large discrimination has been made on the whole in favor of British as against foreign industry—the higher rates of duty being imposed on manufactures, the largest proportion of which, in the aggregate, are being imported from foreign countries.

The increased duties imposed by the Canadian Parliament on iron and steel have been stigmatized as an attack on British industry. A careful examination of the British-Canadian iron and steel trade, in connection with the tariff changes, will not justify this accusation.

Adjoining the southern boundary line of Canada there extends from ocean to ocean the United States of America, a great nation of over 50,000,000 of people. They have attained an enormous industrial development under a highly protective tariff, which is still maintained, and under which comparatively high rates of wages prevail, controlling in a marked degree the price of labor in Canada. Placed in this position, and under such circumstances, Canada is compelled in self defense to adopt a tariff policy in some measure approximating that of the United States, in order to protect domestic industries and to develop the natural resources of the Dominion.

Canada possesses, in an advantageous position, abundance of iron ore, fuel and all the requisites for the manufacturing of iron and steel.

In the steps taken by the Canadian Parliament to foster the manufacture of iron and steel and place the industry on a firm foundation at the outset, Canada is but following the methods adopted by Great Britain, France, Belgium, Germany, the United States and other countries which have succeeded in promoting this great industry.

Whatever be the causes at work, and however disagreeable be the fact to the British manufacturer, it is undeniable that foreign wares are gradually but steadily displacing many British manufactures of iron and steel in the Canadian market.

In this competition it is notable that the highly "protective" country of the United States is the most formidable competitor in machinery, hardware and articles made by skilled labor.

A memorandum is submitted herewith, marked "A," showing the course of the trade of Canada in iron and steel manufactures thereof as respects Great Britain and the United States, proving the rapidly with which the United States have overtaken and passed Great Britain in competition for Canadian trade:

Total for Ten Years, 1877-86.		
Great Britain, United States.		
Interchangeable machinery.....	\$972,419	\$6,702,032
Hardware, cutlery and edge tools.....	9,563,648	17,918,223
Machinery.....	3,203,987	10,256,145
Castings and forgings.....	2,476,538	2,867,211
Rails and railway supplies.....	21,679,861	3,596,891
Other forms of iron.....	33,496,372	5,851,014
Pig iron.....	4,588,172	1,948,532
Totals.....	\$75,951,277	\$40,107,978

This statement shows that while in 1868 the trade of the two countries with Canada in four classes comprising the higher forms of iron and steel goods requiring skilled labor was in the proportion of 58 per cent. by Great Britain and 42 per cent. by the United States, that trade has since become so revolutionized that during 10 years (from 1877 to 1886 both inclusive) the proportion has been 70 per cent. for the United States and 30 per cent. for Great Britain.

Under these conditions, the pertinent question to be considered is this: How shall Canada overcome the increasing dependence on foreign sources for her enormous annual requirements of iron and steel?

Considering the magnitude of the interests involved, and in view of Canada's rich and varied mineral resources, the effort to develop domestic production cannot be fairly characterized as an attack upon British industry or opposed to the true interests of the empire.

In the recent tariff charges the scale of duties adopted has not, as a rule, exceeded two-thirds of the rates now in force in the United States, and British iron and steel manufactures to the value of millions of dollars annually will be still admitted into Canada free, or at a low rate of duty.

The following statements of imports into Canada from the fiscal years ending June 30, 1881 and 1886, indicate the course and extent of the iron and steel trade with Canada at two periods five years apart, and speak for themselves:

Iron and Steel and Manufactures thereof imported into Canada for years ending June 30, 1881.

Particulars.	Percentage.	Imports from Britain.	Imports from other countries.	Total imports.
Dutiable.....	55	\$4,684,481	\$3,798,113	\$8,472,594
Ditto.....	45	3,749,510	848,067	3,996,407
Free of duty.....	0	—	—	—
Total.....	—	\$8,431,991	\$4,635,100	\$12,467,091

For Year ending June 30, 1886.

Particulars.	Percentage.	Imports from Britain.	Imports from other countries.	Total imports.
Dutiable.....	50	\$8,902,711	\$8,969,654	\$17,872,365
Ditto.....	50	8,028,571	418,763	8,447,334
Free of duty.....	0	—	—	—
Total.....	—	\$16,931,282	\$9,388,417	\$26,319,699

The amended tariff, if applied to the whole Canadian imports of iron and steel for

the year ending June 30, 1886, shows the following results, as near as can be estimated:

Particulars.	Percentage.	Imports from Britain.	Imports from other countries.	Total imports.
Free goods.....	80	\$2,508,581	—	\$2,508,581
Ditto.....	14	—	\$419,634	\$419,634
Imports subject to 12 1/2 % duty or less.....	63	808,637	—	808,637
Ditto.....	7	—	54,845	54,845
Imports subject to duty of over 12 1/2 % not over 25 %.....	62	559,760	—	559,760
Ditto.....	38	—	344,514	344,514
Imports subject to duty of over 25 %.....	43	2,684,354	—	2,684,354
Ditto.....	57	—	3,599,425	3,599,425
Total.....	—	6,621,982	4,418,417	11,039,699

The above statement does not embrace military stores and articles imported by and for the use of the Canadian Government, which are admitted free of duty.

In the adjustment of duties it will be seen that a large discrimination has been made on the whole in favor of British as against foreign industry, the higher rates of duty being imposed on manufactures, the largest proportion of which, in the aggregate, are being imported from foreign countries.

By the changes made, it cannot be claimed that any "great British industry has been unexpectedly attacked."

All goods purchased prior to the recent changes (May 13), will be admitted at the old rate of duty; and as it will take Canada some time to obtain any marked development in iron manufacture, imports will be made as usual in the heavier lines from Great Britain for a few years, Canada will still remain a valuable customer for the British iron manufacturer, and in many important branches of the trade the imports will be large for many years to come.

Canada has expended over \$100,000,000 in perfecting a transcontinental line of railway communication between the Atlantic and Pacific oceans, which will be of the greatest advantage to Imperial interests.

In ceasing to be dependent on foreign sources for the product of materials which exist in profusion within her borders, and by the development of her great natural resources, Canada may hope to attain a more prosperous position and become a source of strength to the British Empire.

**Basic Steel in the Open-Hearth Furnace.**—It is understood that, after a series of experiments extending over a considerable time, Mr. James Riley, manager of the Steel Company of Scotland, has succeeded in producing good basic steel in the open-hearth furnace. The steel has been produced so frequently, and is of so uniformly excellent ductile quality, as to leave no doubt about the success of Mr. Riley's experiments. The preparation of the open basic furnace was taken in hand for Mr. Riley by Mr. J. W. Wailes, of the Patent Shaft and Axletree Company, Wednesbury, and the latter gentleman will read a paper on the subject at the forthcoming autumn meeting of the Iron and Steel Institute at Manchester. The subject will have a special interest on account of the recent admission of basic steel, after the application of the severest tests, to use by the Admiralty. It is admitted that the use of the Bessemer furnace in the production of basic steel leaves considerable room for improvement, and the making of this material in the open-hearth furnace is likely to mark a very important advance in steel manufacture.

The heating of passenger cars is a subject treated at some length by the railroad commissioners of Massachusetts in a circular addressed to all the railroad corporations in that State. Under the law which took effect last spring the common car stove is excluded altogether, and no furnace or heater of any kind can be introduced without first obtaining the approval of the commissioners. In selecting heating apparatus the board recommend the adoption of the system of heating by steam from the locomotive, or, at least, of such approved apparatus as can be readily converted into such system. They do not consider it practicable to dispense wholly with the separate heater, or to make so radical a change as that contemplated before the coming of the frosty season. In Pennsylvania, although there is no legislative enactment on the subject, the Pennsylvania Railroad Company will heat all their cars by steam from the locomotive the coming winter. There will be some disadvantages to be encountered, but only in case of accident to the locomotive or to the heating apparatus. In order to meet such emergencies it is likely that the stoves at present in the cars will not be removed. The steam process of heating, however, will have decided advantages over the old method in railroad economies. It will require less labor and will not be as expensive as coal. A discovery was made during these tests which was a surprise to experts. This was that it would only take a pressure of 4 or 5 pounds of steam from the locomotive to keep up uniform heat through a train of eight coaches. The tests already made have been complete enough to demonstrate that a locomotive can generate enough steam to draw a train and supply the coaches.

Justice Blatchford, of the United States Supreme Court, has decided in favor of the defendants in the case of Russell Wheeler, Son & Co., of Utica, against Gilbert Hart & Co. on the Goodenow & Owen patent on hot-air furnaces. It was held that the furnace manufactured by the latter is not an infringement upon the Palace furnace made by Wheeler, Son & Co., and the case was dismissed.

John R. Byrne, a member of the Executive Board of the Knights of Labor in the coke district, has notified the coke syndicate to name an early day for a conference to arrange a sliding scale of wages. The employees will present the scale signed by the Frick Coke Company, with few changes,

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**EAGLE PURIFIED FIRE-PROOF STOVE VARNISH.**  
For Quick Polish in Dry or Damp Weather, for Varnishing Polished Edges of Stoves and for the Preservation of Stoves and all Bright Metals from Rust, it is Superior to all other.

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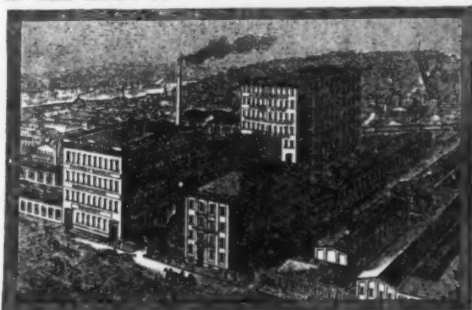
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**Babcock & Wilcox Boiler**

FIRST ORDER FOR  
Menlo Park, N. J., 1878, - 75 H.P.

LAST ORDER FOR  
New York Stations, 1887, 8700 H.P.

TOTAL

Of the 35 Orders,  
**14,230 H.P.**

—Aug., 1887.—

—THE—  
**Babcock & Wilcox Boiler**

Copy.] The Edison [Dictated.]  
United Mfg Co., 65 Fifth Ave.  
NEW YORK, June 30th, 1887.

THE BABCOCK & WILCOX CO.,  
30 Cortlandt St., New York City.  
GEORGE BABCOCK, Esq., President.

MY DEAR SIR:—  
In answer to your inquiry in regard to the Babcock & Wilcox boilers in use at the Pearl Street Station since the fall of 1881, I give me pleasure to state that these boilers have been subjected continually to the most severe use it is possible to put a boiler to, and frequently they have been run to a capacity fully 60 per cent. above their rated power; and yet, I am free to say, in that time they have not given us the slightest trouble, and the amount that they have cost for maintenance of the pressure parts has, covering that period, been practically nothing. They gave plenty of dry steam, and have been absolutely tight at all times.

The boilers have shown unusual ability to carry a constant pressure under the extreme and sudden fluctuations which are unavoidable in an electric light station.

While I was in charge of the Pearl Street Station, I taxed these boilers for more than I believed they would stand, frequently, and I am perfectly willing to state that in no case did they fail to respond generously—so much so that I look upon them as a friend; and I am quite sure it is everyone's duty to speak well of a friend in need, as well as in deed.

Believing this will be satisfactory, I remain,  
Very truly yours,  
G. E. CHESNOK, Vice-President.

Construction Committee  
FOR  
Edison Electric Illuminating Co. of New York

Committee,  
E. H. Johnson,  
C. H. Conder,  
C. E. Chinnock,  
John I. Beggs.  
ENGINEER'S OFFICE,  
Room 53, 16 Broad St.  
New York, July 28th, 1887.

Engineer,  
J. H. Vail.  
THE BABCOCK & WILCOX CO.,  
30 Cortlandt Street, City.

GENTLEMEN:—  
You are hereby notified that your proposals are accepted for water tube boilers, to be used in the three new stations of the Edison Electric Illuminating Company of New York City.

The horse-power required in these three stations will aggregate 8700 horse power.

I enclose you herewith contracts in triplicate, covering the boilers now required for station in 26th Street.

Please execute contract and return two copies to me.  
Yours truly,  
J. H. VAIL,  
Chief Engineer.

For EDISON STATIONS.

Enclosures.

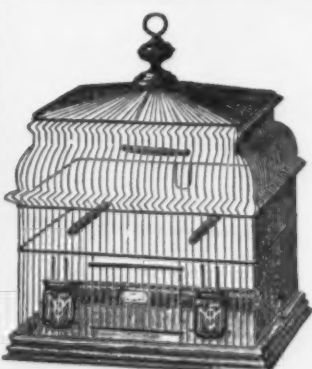
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ENGRAVERS WORCESTER, MASS.



## Cork and Its Uses.

In view of the rapidly increasing uses of cork for mechanical purposes, a few particulars relating to it will not be without interest. Cork, according to a recent article in *Industries*, is built of a multitude of minute water-tight air chambers, and so long as the contained air does not escape we have a substance which reacts against pressure with the almost perfect permanent elasticity of a confined gas, rather than with the inferior elasticity of ordinary solids. The cork of an old wine bottle shows admirably how long its elasticity is retained, and experiments show that cork may be compressed and released in water many thousand times without diminution of this valuable property. Hence arise some ingenious recent applications; thus gun carriages are now being made with cork instead of hydraulic "compressors," storing thus a portion of the energy of recoil of the cannon for the purpose of running it out again afterward. In the same way a considerable improvement in the working and efficiency of hydraulic rams is obtained by using cork instead of air as a spring by which to insure the regularity of the flow.

The common cork oak grows freely along the shores of the Mediterranean, but the chief seat of its culture is in Southern France. Algiers promises also to be a cork-producing country of great importance. The other species is especially cultivated in Gascony. In both cases the natural or virgin cork is of little value, being not only full of cracks and rents, but of comparatively low elasticity. It is removed by making a couple of longitudinal incisions, one on each side of the tree, and cautiously stripping off the cork in two long half cylinders. But, as this leads—especially if the sirocco wind happens to rise—to a drying up of the inner bark, as well as exposing it to the attacks of insects, an ingenious cork grower has commenced to tie on again the separated cork for three months or so, during which time the separated layer has not only dried as well as if it were stacked in the ordinary way, but the new layer has made much more rapid and uniform progress, so insuring the next crop a year sooner and of better quality. The first crop is not gathered till the tree is about 30 years old, the succeeding ones at intervals of nine or ten years thereafter; and, as even the second crop is of inferior quality, the lateness and slowness of production of this substance, which seems in practical use at once so cheap and so transitory, is not a little remarkable. The uses of virgin cork are comparatively few; corks can indeed be cut here and there from the best pieces, but the most familiar application is that to fishermen's floats. In Algeria the Kabyles use it for roofing purposes, for beehives, &c., while it has also been imported for the decoration of ferneries and rustic work. The better crops are carefully sorted according to their quality; the finest—that used for champagne corks—fetching seven or eight times as much as the commonest quality. Various mechanical processes of cork cutting have been introduced, but hand labor still holds its own, especially where the best corks are required. A good workman can make 2000 in a day, in spite of the incessant sharpening of his knife, which is rapidly blunted owing to the presence of microscopic crystals in the cell walls. As an attentive examination of any cork will show, it is cut with its long axis parallel to that of the tree. Bungs, of course, have to be cut in the opposite direction, hence their deficient durability and efficiency. From a hundred-weight of raw cork, little more than 40 pounds of good corks can be obtained; but this enormous proportion of waste product is the raw material of new industries. The coarsest cork powder makes in every way one of the best possible packing substances, since at once more elastic and lighter than anything else, whilst the finest is becoming used as a cosmetic for the most delicate skin, often entering into the manufacture of violet powder. The most important use of cork waste is, however, in the manufacture of linoleum, which represents so great an improvement upon oil cloth, the principle being simply that of mixing cork powder with oxidized linseed oil, and laying the paste uniformly upon a stout and durable fabric. Mixed with a little starch paste and compressed in mold, cork waste can be worked up in many qualities and forms; thus the cylindrical coatings of steam pipes are largely produced in this way, while similarly cork bricks, cork panels, cork sheets for partitions, &c., are all employed where non-conducting properties for sound and heat, together with lightness and cheapness, are required.

A strike against lasting machines has taken place among the shoemakers at Brockton, Mass. The machines were introduced by Senator Douglass, who says he will run them with non-union men or sell out his factory. "My object in putting in the machines," he says, "is to supply the demand for a shoe without tacks or nails in it, and if I can furnish it with these machines for the same money that it has cost to last it by hand, I shall be satisfied."

A patent recently granted to William H. Brown, of Jersey City, relates to the manufacture of continuous tin plates. The plates in question are made of steel, and the process consists in producing a sheet of steel of any continuous length and of required width by first rolling the metal hot and afterward rolling it cold, until a proper thickness and perfectly smooth surface is obtained. Next, the surface of the sheet is scoured, and then it is afterward passed through a bath of molten tin, thus receiving its coating. Finally, the sheet is subjected to a rolling operation, under heavy pressure, between highly polished rolls, by which the tin and steel are condensed and consolidated together, and the surface hardened and polished. The patent drawings show the apparatus that would be used in scouring the continuous sheets for the coating operation above described, and also the tinning bath and its appurtenances. The inventor says that by this method the tin will be found to be so hardened upon, and incorporated with the steel, as to produce a

tin plate which is superior in most respects to any tin plate wherever produced, and which, owing to the homogeneous molecular structure of steel, differs essentially from any tinned iron plate, because the fibrous structure of the iron would render it impossible to subject it after tinning to such a heavy rolling as is here employed without its working its fibers into or through the tin in such a manner as to leave the tin very thin in some places, or breaking through it entirely. The purpose to which these plates are to be applied is the same as that for which tin plates are at present employed—namely, roofing tinware, &c.

## The New Vertical Otto Gas Engine.

The Otto engines of well known horizontal type have answered all requirements in such satisfactory manner that there seems almost no reason for supplying the same engines of vertical design. It was found, however, that in some cases the room allowed for the placing of engines was so limited as to render a vertical engine quite desirable, especially where the power needed was but limited. For larger powers the objections generally raised to this form—too narrow a basis and necessary heavy masonry below it, great distance between floor line and center of engine-shaft, and, hence, difficulty of avoiding rocking—would fully apply in the case of gas engines, they being

seems indeed not to admit of further simplification. The gear-shaft H, which gives motion to the slide K, the exhaust-valve, and the pendulum-governor G, at the same time are driven by spiral gearing running silently and driving also an oiling apparatus, mounted on the top of the casing A covering the gearing and intended to oil the cylinder and slide valve by means of small brass tubes, not shown. Instead of the usual rotary governor implying a series of gear-wheels or power transmission by belt for ob-

without opening it. Fig. 2 shows the governor with the blade E propped in a horizontal position by means of a small stop leaning against the governor weight. This stop will disengage itself as soon as the normal speed of the engine is reached and hang downward, giving free motion to the weight to swing. In case of the stoppage of the engine, the governor weight being no longer held by the stop, will hang down and raise the blade out of possible range of contact with gas-valve stem, thus automatically cut-

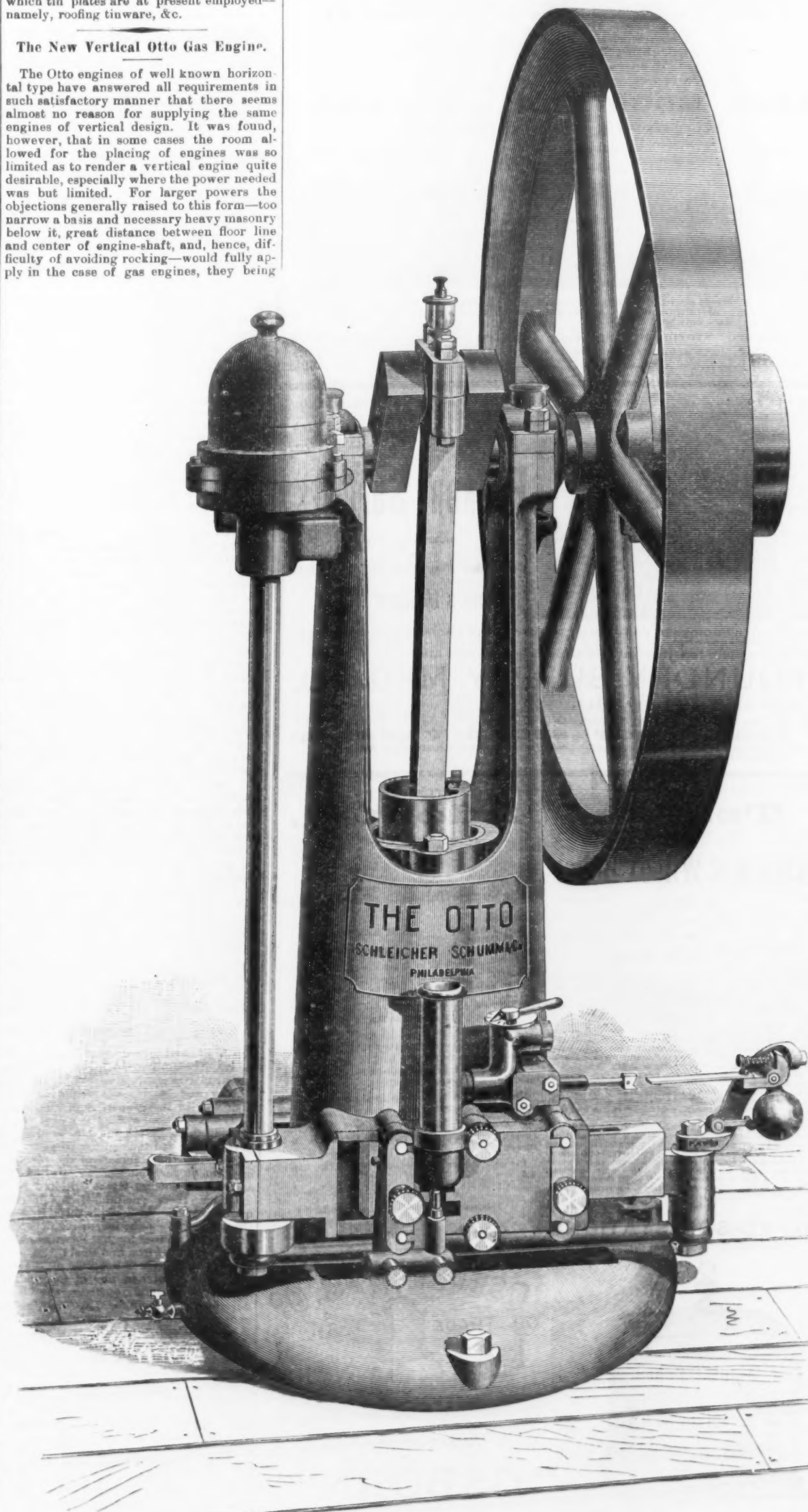


Fig. 1.—Perspective View.

THE NEW VERTICAL OTTO GAS ENGINE, BUILT BY THE OTTO GAS ENGINE WORKS, PHILADELPHIA, PA.

generally used where foundations of extra strength and cost are not practical—in upper floors, &c. Otto engines of vertical form have been built up to 4 horse-power only during the last couple of years by the Otto engine makers in England and Germany, various mechanical arrangements and designs having been used by the different builders. One of these we show in section and illustrate in a perspective view. The design is that adopted by the Otto Gas Engine Works, of Philadelphia, Pa., who have aimed to embody the simplest devices used by the other makers in one machine, securing an engine that is easily understood and run by everybody, cheap in manufacture and offered at a popular price.

The illustrations show an engine which

taining motion, a very original governor is used, depending for its action on reciprocating motion and consuming hardly any power. This governor constitutes one of the specially interesting features of the engine, and is very well shown in both engravings. It was styled a pendulum-governor and was patented by Messrs. Crossley Bros., of Manchester, England. It consists of one weight only, G, swinging on a pin attached by bracket to the slide K of engine. Its operation is based on the inertia of this weight, which, at a given speed, will refuse to follow the reciprocating motion of the slide and hang back, thereby causing the blade E attached to it and intended to open the gas-valve C to take an inclined position and thus to pass below the gas-valve stem D

ting off gas and preventing any possible leak. By means of the spring F the tension may be easily regulated. The governor is found to be very sensitive, and, we are told, is used on gas engines, driving dynamos with perfect results. Besides using it on their vertical engines, the Otto Gas Engine Works have adopted it on some sizes of their horizontal engines, the simplicity of the device constituting a decided gain.

The vertical engine illustrated yields on the brake one net horse power and is of sufficient power for many cases where rotary fans are to be run in offices, restaurants, or private houses. It also answers the requirements of most printers, ice-cream makers, confectioners, and will furnish power for pipe-threading machines in gas or steam-

fitters' shops, or for metal rollers of tinsmiths, roofers, &c. The gas consumption is low, as in the case of the well-known horizontal Otto engines, and the expense is merely nominal in an engine of the size described, averaging probably from 1½ to 2 cents per hour at \$1.50 for 1000 feet of gas. It is claimed that there is no gas or calorific engine in the market giving the same power and same economy which is offered at so low a figure. The builders, we understand, are already behind in their deliveries on this little motor, though foreseeing its popularity on account of its low price, simplicity and economy, they placed a large number in their shops.

## Experimental Work with Ships' Models.

Among the many men not directly in the profession, who have done much to aid the science of naval architecture, the name of the late Dr. William Froude stands pre-eminent. His beautifully contrived experiments with small scale models of ships, coupled with his application of the law by which such experiments can be made to afford reliable data regarding the speed and resistance of full-sized vessels, have been of special value, and the influence which they exert on everyday practice cannot well be overestimated. Of these and succeeding experiments a very interesting account is given in a recent issue of *Industries* (London), from which we quote: "Dr. Froude began the work of speed investigations with ships' models at the experimental tank at Torquay, about 1872, carrying it on uninterruptedly until his lamented death in 1879. Since his decease the work of investigation and experiment with ships' models for the Admiralty has been carried on by his son, Mr. R. E. Froude, who ably assisted his father and originated much of the existing apparatus. At the beginning of last year, the whole experimental appliances and effects were removed from Torquay to Haslar, near Portsmouth, where a larger tank and more commodious offices have been constructed, with a view to entering extensively upon the work of experimental investigation. The dimensions of the old tank were 280 feet in length, 36 feet in width, and 10 feet in depth. The new one is about 400 feet long, 20 feet wide and 9 feet deep. The construction of a new tank is sufficient proof of the high value which the Admiralty attach to this work, and the practical use to which the investigations and results may be applied. That many valuable and useful results accrued from the researches made at the old Torquay establishment is well known. The designs of ships in many instances were altered after trials with their models; notably in the case of the well-known torpedo ram Polyphemus and the Medway class of gunboats. In the latter case, some doubt arose in the minds of the designers as to whether increased beam would not be advisable; accordingly, a model was made with much greater breadth. The experiments proved conclusively the advantage to be gained, and the result was verified afterward in the actual ship. Being instituted for Admiralty purposes, the work carried on principally relates to Government vessels, but the necessity for model experiments is a want increasingly felt among many private shipbuilders in estimating the speed and power of vessels of unusual types, where empirical formulae do not apply, and where data for previous ships are not available. The only private firm of shipbuilders at present having such means of determining the relation of speed and power, is that of Messrs. William Denny & Bros., of Dumbarton. In connection with their establishment they have an experimental tank 300 feet long, 22 feet wide and 10 feet deep, with dynamometric apparatus, similar to the Admiralty apparatus, for measuring the resistances of models of ships.

The primary object of model experiments is to obtain the resistance of a full-sized ship similar to the model, at various speeds, by measuring the resistance of the model at "corresponding speeds." The models, it may be well first to explain, are made of paraffine wax, a material well adapted for the purpose, being easily worked, and requiring much less time and skill than if made of wood. It is also more economical than wood, for when finished with the models may be re-melted for further use. The models are produced in the following manner: A mold is formed in clay by means of cross-sections, made somewhat larger than is actually required. Into this mold a core is placed, built of a light wooden framework covered with calico and coated with a thick solution of clay, to make it impervious to the melted paraffine. The paraffine, which melts at about 130° F., is run into the space between the core and the mold and allowed to cool. When cold the model is removed from the mold, washed and placed on a cutting machine, which is an ingenious piece of mechanism, devised by the late Mr. Froude, to aid in reducing the rough casting to the accurate form. The bed of this machine can be raised or lowered to any desired level by adjusting screws. While the operator traces out the lines from a drawing placed on a board geared to the machine—the travel of which is a function of the travel of the bed on which the model rests—two knives, revolving one on each side of the model, at a speed of from 1200 to 1500 revolutions per minute, cut corresponding lines on the model at the desired level. By this means a series of level lines are cut, and the superfluous material between the cuts is afterward removed by hand, and the model brought to the correct form. To test accuracy of form, the weight of model is carefully taken, and the displacement at the draft under consideration accurately determined from the model drawing. The difference between the weight and displacement at the draft intended is then put into the model in the form of ballast, and by a very delicate set of instruments for ascertaining the correct draft, any error, however small, is at once easily detected. The models are by no means diminutive, but vary in size from about one-tenth to one-thirtieth of the actual ship, and, when occasion requires, a model of this size can be produced, and its resistance determined at a number of speeds in a little over two days.



For the purpose of ascertaining the resistance, the model is attached to a dynamometric apparatus secured to a carriage, which travels on a railway running the whole length of the tank, about 15 inches or 18 inches above the water. The model is carefully guided by a delicate device, keeping it from deviating either to the right or left, but at the same time allowing a free vertical and horizontal motion during its passage through the water. The carriage, with the model attached, is propelled by means of a steel wire rope passing around a pulley at each end of the tank, and around a drum driven by a small stationary engine, fitted with a very sensitive governor, capable of being adjusted so that any required speed may be given to the apparatus and model.

The resistance of the model at any speed is measured by means of the extension of a spring, the amount of which extension is recorded on a revolving cylinder to a much enlarged scale. On the same cylinder are registered time and distance diagrams, by means of which a correct measure of the speed is obtained. The time diagram is recorded by means of a clock attached to an electric circuit, making contact every half second, and actuating a pen which forms an indent in what would otherwise be a straight line on the paper. The distance pen, by a similar arrangement, makes an indent in another line on the cylinder, each indent corresponding to fixed distances of travel along the tank. From these time and distance diagrams, accurate account can be taken of the speed at which the model and its supporting carriage have been driven. Thus on the same cylinder is recorded graphically the speed and resistance of the model. The carriage may be driven at any assigned speed by adjusting the governor already alluded to; but the record of the speed obtained by means of the time and distance diagrams is more definite. When the resistances of the model have been obtained at several speeds, varying in some cases from 50 to 1000 feet per minute, the speeds are set off in suitable units along a base line, and for every speed at which resistance is measured, the resistance is set off to scale as an ordinate value at these speeds. A curve passing through these spots constitutes what is called the "curve of resistance," and expresses the resistance experienced by the model at any intermediate speed.

Results obtained from the model are now applied to the full-sized ship. By the law proved experimentally by the late Mr. Froude, which is that "at corresponding speeds the resistances of similar ships vary as the cubes of their respective dimensions," the resistance of a ship similar to the model may be deduced from the model's resistance curve, already obtained by experiment. The total resistance of model or ship, it should be explained, is actually made up of two main parts—viz., that due to surface friction, and the remainder caused by wave making and eddy-making. From extensive experiments made on the surface friction of planes, varying in length from a few inches to 50 feet, and differing in quality of surface, formulae have been deduced by Mr. Froude, from which the first element—viz., that of surface friction—may be calculated. The amount of the latter, however, can only be made known by actual experiment with the form under consideration. Mr. Froude determined from these experiments also that a short plane experiences a greater resistance per square foot in being towed through the water than a plane of greater length. Therefore, in estimating the resistance of the ship from its model due allowance must be made for this difference in surface friction. But when similar ships are compared, the difference due to small variations in length is unimportant and may be ignored.

The direct advantages to be realized from the results of these experimental researches are many. The most suitable form for a certain speed may be determined, and the proper adjustment of power to form arranged. On the other hand, with a vessel having a given form, the most suitable speed can be selected at which it would be most economically propelled. The form and positions of the waves created by the passage of the ship through the water at any speed may be determined from that of the model. This is especially important in dealing with paddle wheel vessels, where the most suitable position for the wheel may be obtained for the maintenance of efficiency, consistent with due immersion. The bodily subsidence which takes place while running may also be accurately measured, this being an important feature in torpedo boats and other light-draft vessels. The speeds at which the models can be run at being relatively very great, the behavior of the ships, in so far as form is concerned, may be predicted at speeds greater than is at present realized. Such comparisons show the possibilities or impossibilities of further advancement in propulsion, so far as form is concerned.

From the towing experiments with H.M.S. Greyhound, the late Mr. Froude was enabled to draw attention to one fact, very important from an economical point of view. He pointed out that, near the load draught, the resistance does not increase nearly so fast as the displacement. From model experiments the effective horse-power of the ship may be also obtained for any and every condition of level keel and trim at all speeds. In this way the designer can be furnished with data before her construction, which cannot at present be arrived at by processes of theoretical reasoning, but can only be deduced experimentally.

It is, perhaps, not safe to say that when the best form has been obtained for the model in still water, it will be the best for the ship in rough water. Slight modifications may be essential to suit practical experience at sea. However, taking the lowest possible ground, the experimental method of estimating, along with previous data of trials for other ships affords the naval architect a confidence which he would not otherwise have.

It is not infrequently happens that much power is absolutely wasted in the propulsion of an unsuitable form, and waste of power means an unnecessarily large and consequently heavier engine, with an aggravated

coal consumption, besides loss of dead weight capacity or carrying power. On the other hand, displacement is often sacrificed to attain a certain speed, when the speed may frequently be obtained without such a sacrifice. Loss of dead weight capacity and increased coal consumption are decided commercial disadvantages, meaning an increase of expenditure, both in prime cost and maintenance. It also means that the steaming performance is decidedly inferior to what it would be in cases where the relation of power to form is carefully adjusted.

Another feature of no small moment affecting the steaming capability of a ship is the relation of her length to the wave system which she creates while running. If the length be such that while being propelled at a constant speed the wave raised at the bow repeats itself just before the stern post, the effect of the wave is to assist propulsion; on the other hand, if a hallow presents itself at this point the resistance is increased. This is a fact worthy of greater attention in the design of ships, both from a speed and from an economical point of view, especially in

ment of a tank for the use of Clyde ship builders and engineers. He said: "I do think it desirable that the many eminent ship-builders and marine engineers on this river should unite together to construct a tank, where the models of vessels proposed to be built by the subscribers may have their curves of resistance determined. If such a tank were placed in connection with the Chair of Naval Architecture at this university, it would prove of immense advantage to the students, in addition to fulfilling the primary object of its construction; and I venture to express a hope that the Clyde ship-builders and marine engineers may give their way, at no distant date, to give practical effect to a proposal that would be productive at the same time of so much advantage to the science of naval architecture and to themselves."

#### Some Data on Steam Heating.

In the July number of *The Stevens Indicator*, Mr. A. R. Wolff gives the following data on steam heating. They cover a

the radiator surface and the boiler capacity to be provided will each have to be, on an average, about 25 per cent. more than where direct radiation is used. This percentage of 25 also marks approximately the increased fuel consumption in the indirect system. When the overhead system of steam heating is employed, in which system direct radiating pipes, usually 1½ inches in diameter, are placed in rows overhead, suspended upon horizontal racks, the pipes running horizontally, and side by side, around the whole interior of the building, from 2 to 3 feet from the walls, and from 2 to 4 feet from the ceiling, the amount of 1½ inch pipe required, according to Mr. C. J. H. Woodbury, for heating mills (for which use this system is deservedly much in vogue), is about 1 foot in length for every 60 cubic feet of space. Of course, as Mr. Woodbury points out, a great range of difference exists, due to the special character of the operating machinery in the mill, "both in respect to the amount of air circulated by the machinery, and also the aid to warming the room by the friction of the

each 100 square feet of heating surface in coils and radiators, 0.375 of a square inch when exhaust steam is used, 0.19 of a square inch when live steam is used, and 0.09 of a square inch for the return. If the cross sectional areas thus obtained are each multiplied by 1½, and the square root extracted from each product, the respective figures obtained will represent the proper diameters, in inches, of the several steam pipes referred to. To the following table, presented by Mr. William Kent, '76, in Vol. VI. of the "Transactions of the American Society of Mechanical Engineers," relating to the height and dimensions of chimneys required for the several horsepower of boilers mentioned, I desire to give my cordial indorsement, as it accords well with the figures of dimensions which have given the most satisfactory results, coming within my own experience and observation. During the last two years I have had occasion to test its value at least 25 times, and in some cases have instituted changes in large steam plants on its basis, with the most gratifying results.

Height of chimney, feet.	RIGHT OF CHIMNEY—FEET.										Side of square chimney, inches.
	50	60	70	80	90	100	110	125	150	175	200
18	23	25	27	29	31	33	35	37	40	43	46
21	25	27	29	31	33	35	37	39	42	45	48
24	27	29	31	33	35	37	39	41	44	47	50
27	29	31	33	35	37	39	41	43	46	49	52
30	31	33	35	37	39	41	43	45	48	51	54
33	33	35	37	39	41	43	45	47	50	53	56
36	35	37	39	41	43	45	47	49	52	55	58
39	37	39	41	43	45	47	49	51	54	57	60
42	39	41	43	45	47	49	51	53	56	59	62
45	41	43	45	47	49	51	53	55	58	61	64
48	43	45	47	49	51	53	55	57	60	63	66
51	45	47	49	51	53	55	57	59	62	65	68
54	47	49	51	53	55	57	59	61	64	67	70
57	49	51	53	55	57	59	61	63	66	69	72
60	51	53	55	57	59	61	63	65	68	71	74
63	53	55	57	59	61	63	65	67	70	73	76
66	55	57	59	61	63	65	67	69	72	75	78
69	57	59	61	63	65	67	69	71	74	77	80
72	59	61	63	65	67	69	71	73	76	79	82
75	61	63	65	67	69	71	73	75	78	81	84
78	63	65	67	69	71	73	75	77	80	83	86
81	65	67	69	71	73	75	77	79	82	85	88
84	67	69	71	73	75	77	79	81	84	87	90

#### NEW PUBLICATIONS.

REPORT OF THE DIRECTOR OF THE MINT upon the Production of the Precious Metals in the United States During the Calendar Year. By James P. Kimball, Director of the Mint.

Dr. Kimball's second report contrasts very favorably with the unwieldy volume which we have been accustomed to from the pen of his predecessor, Mr. Burchard, the latter trying to imitate Dr. Raymond's earlier reports as mineral commissioner. They were wretched aggregations of newspaper clippings, put together without any editorial discretion whatever, dealing in one breath with a 10-foot prospect hole and the operations of the greatest producers. Dr. Kimball has given up the idea of trying to placate the vanity of the possessor of every little prospect of the country, and has reviewed the production of the different States and Territories in a series of chapters in a general way, some of them notable, that of Arizona, written by John A. Church, F. H. Wild, on Idaho, and Spruille Braden, on Montana, being models of what reviews of this kind ought to be. The volume contains a chapter on the production of gold and silver. We note that Dr. Kimball includes in his production statistics of silver quantities of Montana Matte exported. We question whether it is just to count more than a part of this material in that way. Dr. Kimball estimates the stock of coin in the United States on the first of January of the present year at \$641,626,649 gold, and \$331,889,858 silver. The total stock of money, including gold and silver certificates, United States notes and national bank notes is placed at \$1,879,910,935. According to the Mint Bureau the circulation per capita in the United States, on a basis of a population of 59,000,000 souls, is \$10.86 gold, \$5.63 silver and \$15.37 paper, against \$36.58 metallic and \$14.37 paper in France, \$16.52 metallic and \$5.01 paper in Great Britain, and \$11.42 metallic and \$5.47 paper in Germany. Mr. Kimball reviews the statistics available concerning the annual production of gold and silver in the world, taking up each country in turn, and in an appendix gives a number of general statistics on imports and exports and on the coinage of the United States mints.

The Edward Barr Company, of 78 John street, this city, has just published a pamphlet discussing generally the advantages of the use of automatic fire sprinklers in extinguishing fires, and dealing particularly with the Gray dry-pipe system which they control. While this pamphlet naturally is written in the interest of that invention, it will be read with a great deal of interest by all who have large property to protect. We do not remember having seen as clear a statement brought down to figures of the advantages of the use of sprinklers in reducing premiums, and the presentation of the different points bearing on the question whether it is profitable to insure in mutual or in stock companies is clearly dealt with. We can heartily recommend as profitable a perusal of the pamphlet before us.

Some years ago the employees of the Pennsylvania Railroad organized the Pennsylvania Mutual Benefit Association, which appeared to be very successful, as at one time it numbered 7000 members. About a year ago a Relief Association was formed by the company and all the employees joined. This has caused such a falling off in the membership of the Mutual Benefit Association that it has been decided to apply for a dissolution of charter. The statement that the Relief Association was to dissolve is entirely without foundation, as the Relief Association never was more flourishing than at present.

A Baltimore drummer, who had been arrested in North Carolina, was released by Judge Bond of the United States Circuit, on his own recognizance to appear before the Court in North Carolina, on the last Monday in November, with the understanding that the authorities of that State shall make no more arrests for a violation of their law, which requires a license from non-resident salesmen.

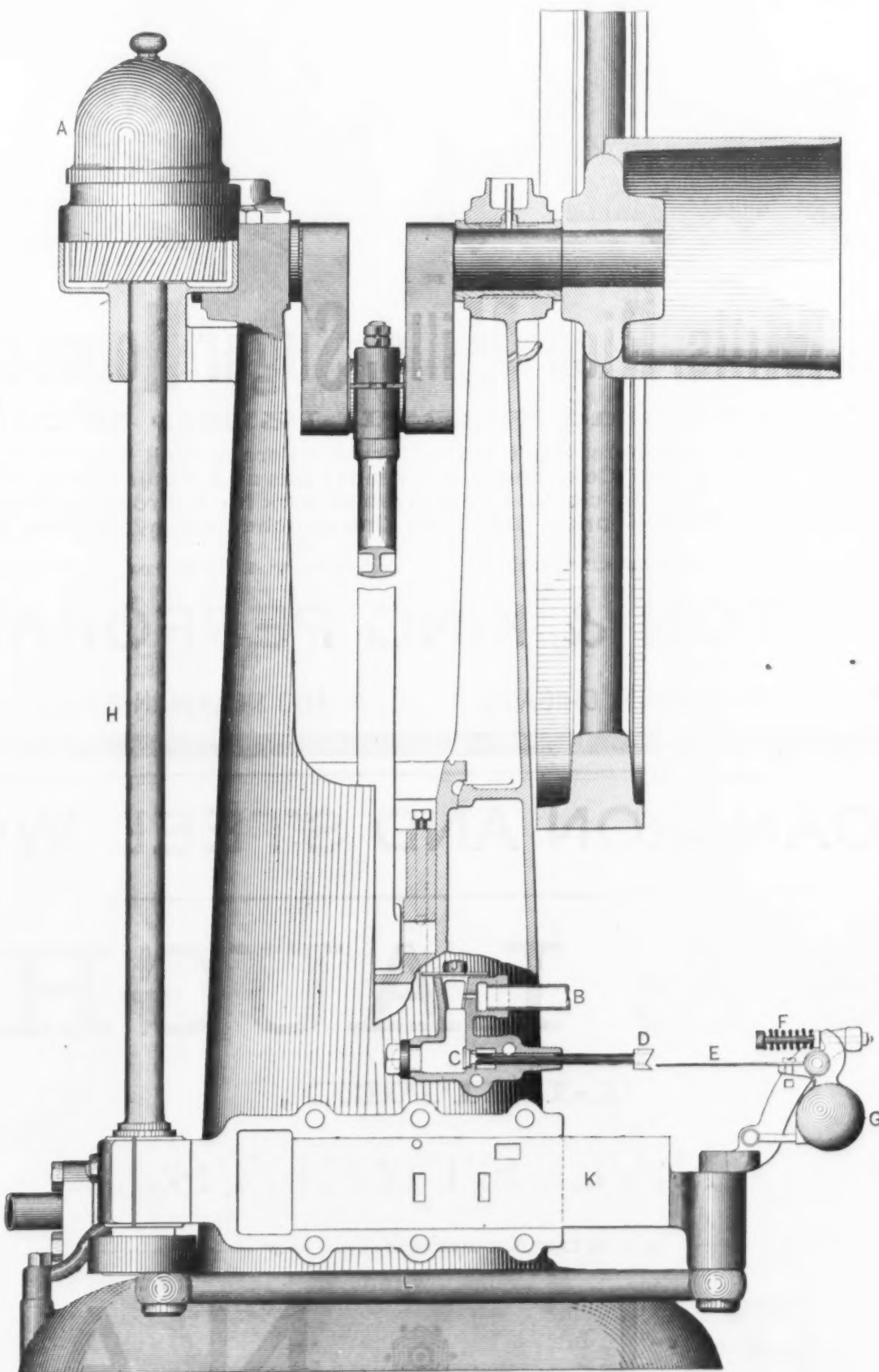


Fig. 2.—Elevation and Section.

THE NEW VERTICAL OTTO GAS ENGINE, BUILT BY THE OTTO GAS ENGINE WORKS, PHILADELPHIA, PA.

the case of ships employed on short voyages, and where the bottom can be more often cleaned. The position of repetition of the bow wave depending on speed, it varies with varying speed; consequently the maximum effect of this wave may not always be obtained with vessels trading exclusively in tropical climates, where the rapid fouling of the bottom plays an important part in reducing speed. Many of the facts which from time to time have been enunciated and demonstrated in connection with experimental investigation have not as yet been reduced to laws or formulae for the guidance of naval architects. Hence the necessity for careful analyses and investigations of further experimental data. If more attention were directed to this mode of procedure, instead of pinning too much faith to Admiralty "constants of performance" and other empirical formulae, we should have less disappointments and fewer surprises at the trials of our steamers.

Recently, in concluding a series of lectures on the subject of the "Resistance of Ships," at the Glasgow University, Prof. P. Jenkins, who occupies the John Elder Chair of Naval Architecture at that institution, dwelt on the great advantages of experiments with models, and urged the establish-

ment of a tank for the use of Clyde ship builders and engineers. He said: "I do think it desirable that the many eminent ship-builders and marine engineers on this river should unite together to construct a tank, where the models of vessels proposed to be built by the subscribers may have their curves of resistance determined. If such a tank were placed in connection with the Chair of Naval Architecture at this university, it would prove of immense advantage to the students, in addition to fulfilling the primary object of its construction; and I venture to express a hope that the Clyde ship-builders and marine engineers may give their way, at no distant date, to give practical effect to a proposal that would be productive at the same time of so much advantage to the science of naval architecture and to themselves."

When the direct system is used to heat buildings, such as abound in our great cities—buildings in which the street floor is a store, and the upper floors are devoted to sales and stock rooms and to light manufacturing, and in which the fronts are of stone or iron, and the sides and the rear of building of brick—a safe rule to follow is to supply one square foot of boiler heating surface for each 700 cubic feet, and 1 square foot of radiating surface for each 100 cubic feet of contents of building. For heating mills, shops and factories, 1 square foot of boiler heating surface should be supplied for each 475 cubic feet of contents of building; and the same allowance should also be made for heating exposed wooden dwellings. For heating foundries and wooden shops, 1 square foot of boiler heating surface should be provided for each 400 cubic feet of contents; and for structures in which glass enters very largely in the construction—such as conservatories, exhibition buildings and the like—1 square foot of boiler heating surface should be provided for each 275 cubic feet of contents of building.

When the indirect system is employed,

journals." Prof. Charles A. Smith gives the following data for the relation between radiating surface and cubic contents, as representing the results of the practice of the Dubuque Steam Supply Company, Dubuque, Iowa. He says: "We find that with the external air ranging to 60° F., 1 square foot of heating surface warms a number of cubic feet, as follows, in columns 2 and 3":

Class of building.	When heaters are direct system, cubic feet per square foot.	When heaters are indirect system, cubic feet per square foot.
Dwellings.....	50	40
Stores, wholesale.....	125	100
Stores, retail.....	100	80
Banks.....	75	60
Offices.....	70	60
Drug stores.....	70	60
Dry goods.....	80	70
Large hotels.....	115	100
Churches.....	300	150

For determining the cross sectional area of pipes (in square inches) for steam mains and returns, it will be ample to allow a constant of 0.375 of a square inch, plus, for



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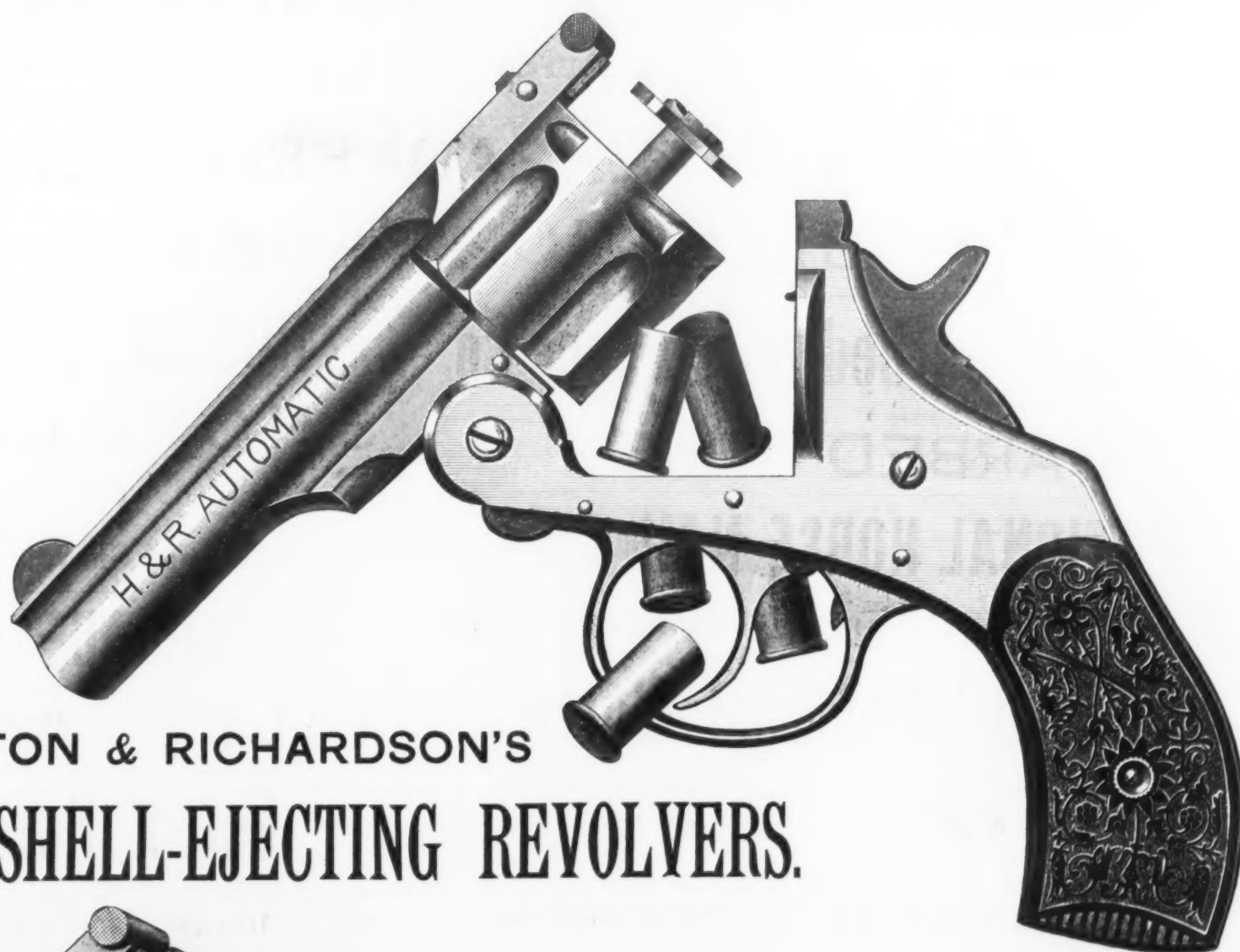
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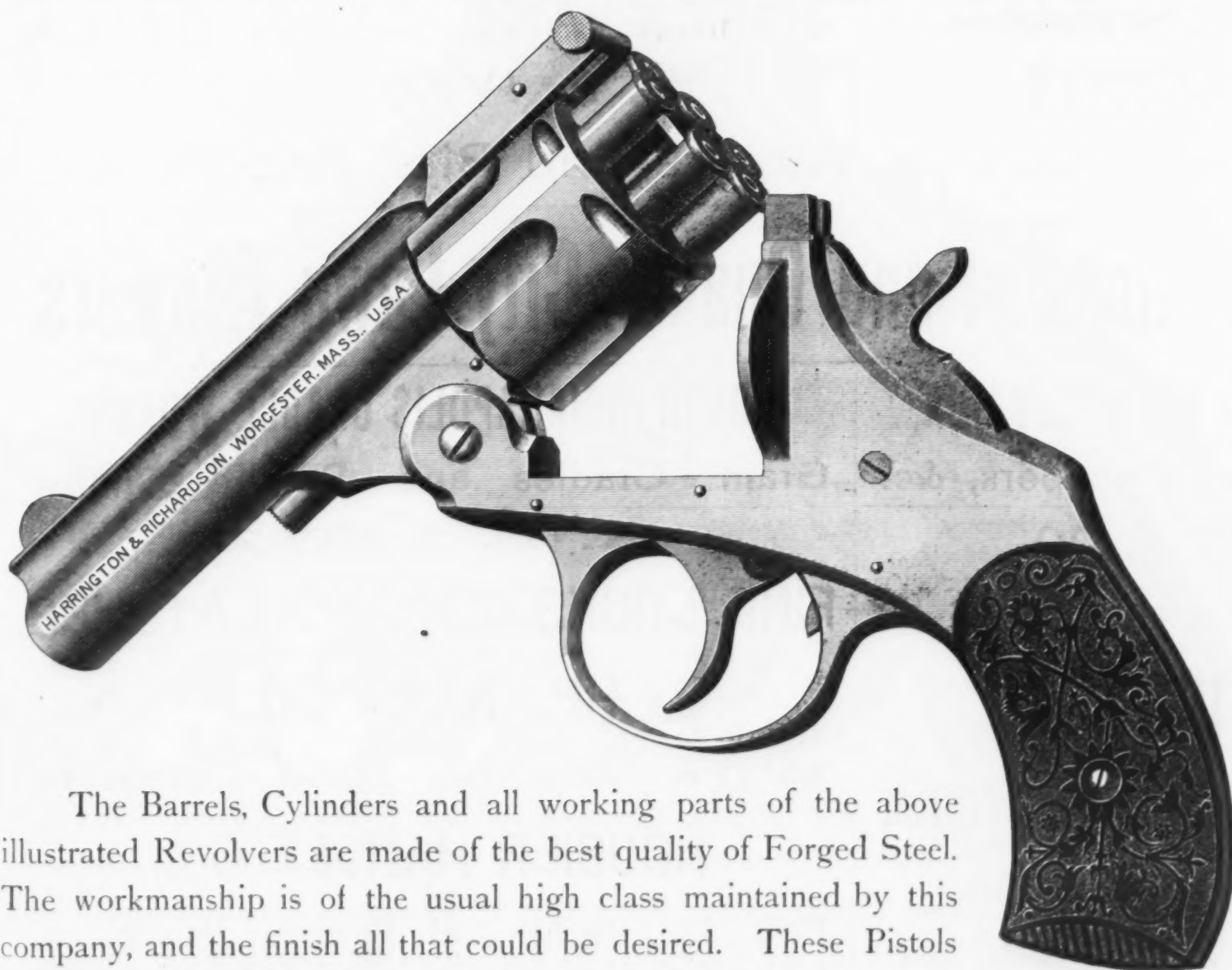


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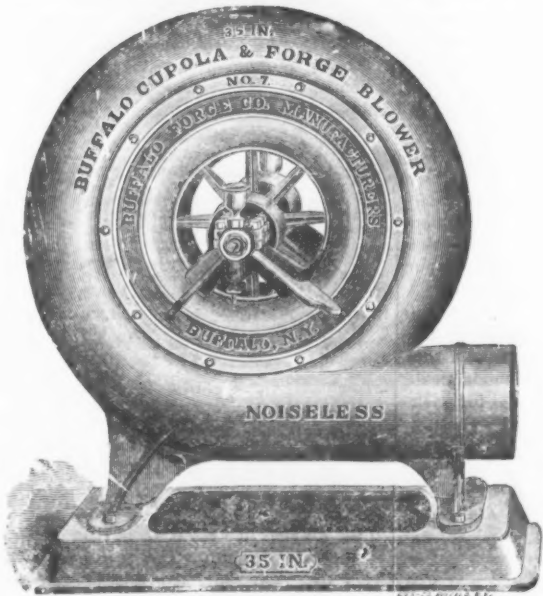
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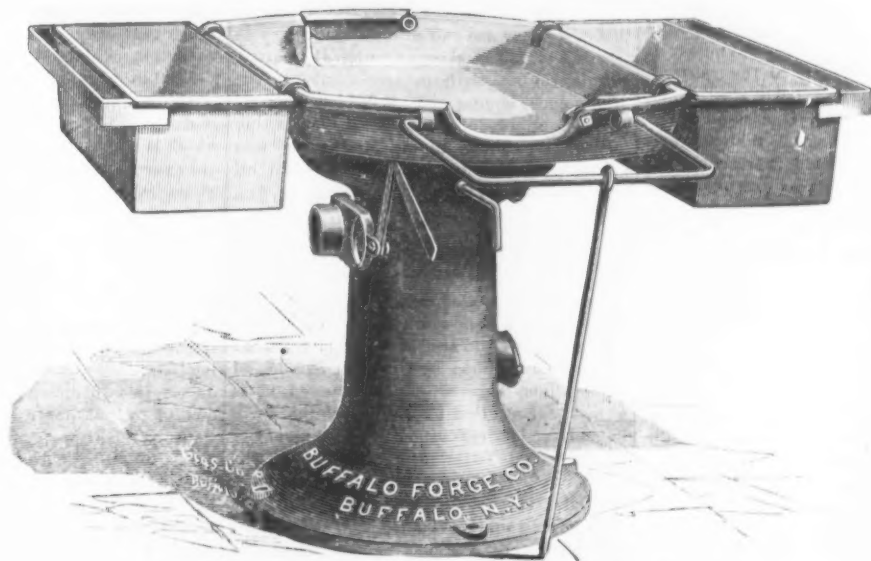
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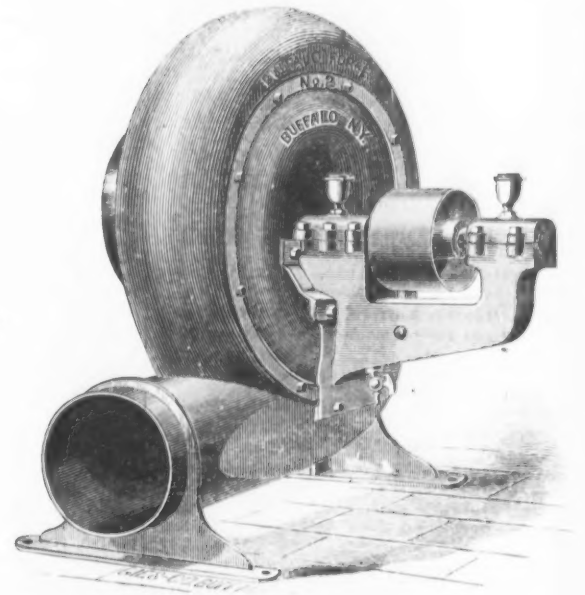
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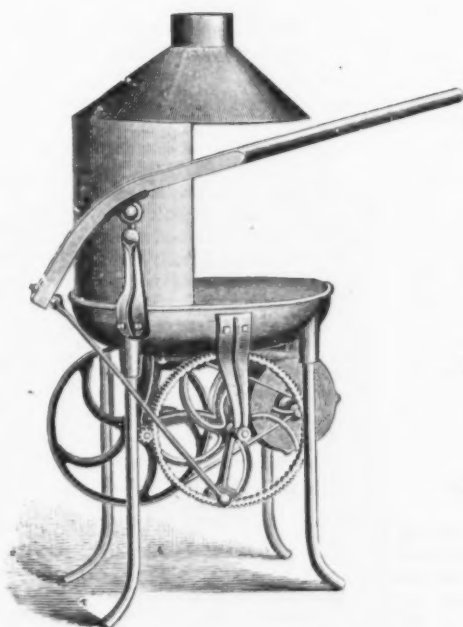


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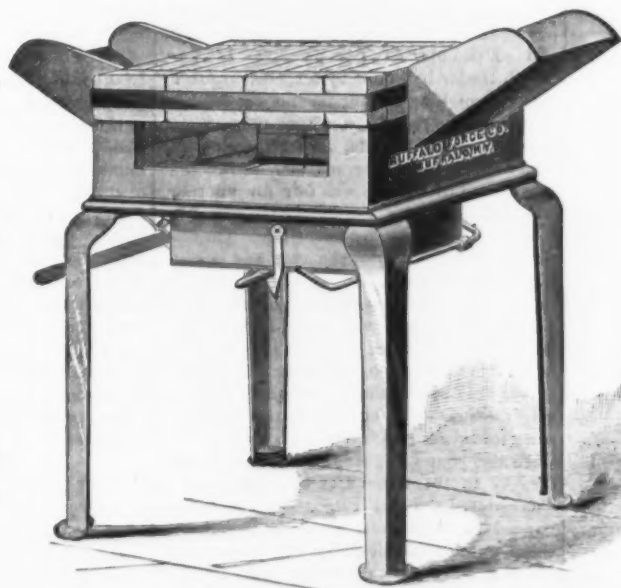


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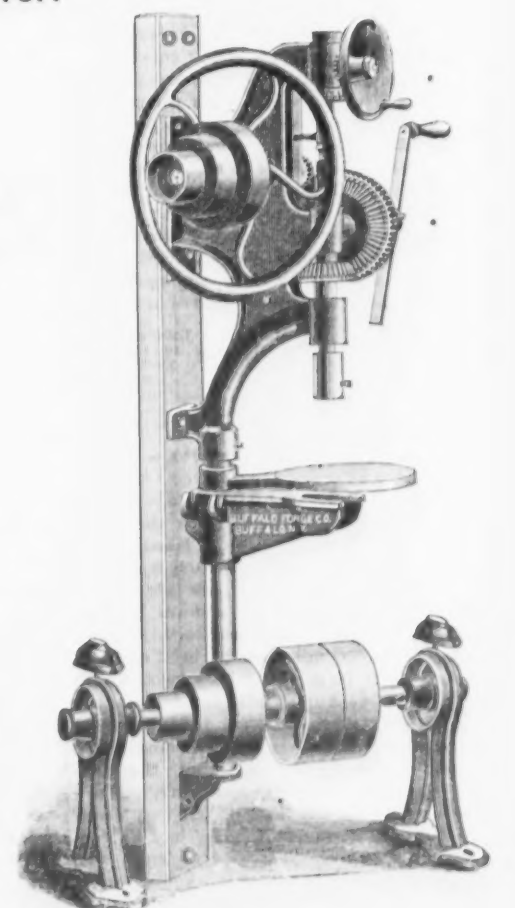
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# The Iron Age

AND METALLURGICAL REVIEW.

New York, Thursday, September 1, 1887.

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### The Demand for Iron by Railroads.

Messrs. H. V. & H. W. Poor have just issued their Manual, the introduction of which usually contains some suggestive figures, although the industries whose greatest customers are the railroads are most keenly interested in current work and future projects. It is for this reason that business men scan most eagerly reports of current earnings and follow reports of new enterprises. Generally, however, the former are put forward in a manner which lacks perspective. Thus a comparison with a previous year may show on its face heavy gains or heavy losses, which are apt to be misleading when it is not taken into account that the basis of comparison is for a particularly prosperous or an unusually poor season. Messrs. Poor's reports for a series of years show the total available revenue for roads, aggregating in mileage the figures given, to have been:

Year.	Mileage reporting.	Total available net revenue.
1880	125,149	\$363,511.04
1881	122,110	352,881.47
1882	115,173	349,756.172
1883	108,008	359,942.327
1884	95,752	315,653.255

This indicates that 1886 was to a moderate degree an improvement over 1885, and probably approached a fair average considering mileage. In that year the gross earnings were \$822,191,949. Messrs. Poor believe that in 1887 it will reach \$900,000,000. On the other hand, we added 9000 miles to our roads in 1886, and are building at the rate of about 11,000 miles this year, a total of 20,000 miles in the brief space of two years. It is not to be expected that this can be kept up at this pace for another 12 months, since it takes time to make feeders and new roads self sustaining. The parent lines will feel this drag, the signs of which are even now appearing, and are being felt in some lines of the iron trade. On the other hand, it must not be forgotten that with increased mileage and steadily growing traffic the annual wear and tear is assuming great proportions. Let us look back only 10 years, and we will find

that the mileage has nearly doubled, being on the 31st of December of the years named:

Year.	Miles in operation.	Annual increase in mileage.
1876	76,808	2,712
1877	79,888	3,280
1878	81,717	2,629
1879	86,493	4,776
1880	93,319	6,826
1881	103,145	9,796
1882	114,713	11,568
1883	121,454	6,741
1884	126,379	4,925
1885	138,957	12,578
1886	137,980	9,000

At the close of the present year our aggregate mileage will be close upon 149,000 miles, and may reach 150,000. The total mileage of 133,606 miles reported by the railroads at the end of their respective fiscal years represented 168,043 miles of track, of which, according to the returns, 105,724 miles were laid with steel rails, leaving apparently over 62,000 miles still railed with iron. Even at less than 50 gross tons to the mile, this would represent a reserve of over 3,000,000 gross tons of old rails to draw upon for some years to come.

Concerning equipment, Messrs. Poor put forward the following figures, showing the status at the end of their fiscal years:

Year.	Locomotive cars.	Passenger cars.	Freight cars.
1880	26,415	19,352	6,325
1881	25,977	17,290	6,044
1882	24,547	17,303	5,911
1883	23,023	16,859	5,848
1884	22,114	15,551	5,566

It will be observed that the number of freight cars was increased by over 40,000 in 1885-86, and that nearly 2000 more passenger cars were in use. This does not, of course, represent the total new equipment, since a large quantity of rolling stock was condemned and replaced. This was particularly true last year, and will prove to be more strikingly shown this year. While it is generally conceded now that, unless a marked change occurs, the consumption of rails will be less in 1888 than in 1887, it is held that the demand for cars and equipment is likely to hold out longer, because the cars for the new roads built this year have not all been ordered, and a good deal of old rolling stock for the leading roads throughout the country remains to be replaced. This would indicate a continuance of the demand for bars, axles and also for car-wheel pig.

### A New Labor Organization.

The large number of organizations now in existence for the amelioration of the condition of the working man or for the preservation of his rights is not enough to satisfy the restless spirits who are consumed with the overwhelming importance of testing their theories of the proper way to manage the labor question. It was at one time supposed by enthusiastic labor leaders that the Knights of Labor would so sweep the field of kindred but less powerful associations that in time it would be considered the only organization worthy of a working-man's support. Time has shown the folly of such expectations, and the field of labor today is being more assiduously cultivated than ever in the interest of organizations which are generally rivals, but are sometimes bitterly antagonistic to one another. The frequent disputes between the Knights of Labor and the Amalgamated Association of Iron and Steel Workers have been conducted with as much display of ill feeling as, and perhaps more than, if one of the two societies was composed of capitalists or employers. But, however these organizations of workmen may antagonize one another, they almost invariably act on one principle, which is to secure advantages or privileges for their members from their employers by means of strikes, boycotts, or other expedients which modern trades-union ingenuity may devise. The leaders, it is true, often counsel their followers to be moderate in their demands, deliberate in their actions and slow to resort to extreme measures, but the use of these extreme measures is nevertheless always within reach to enforce the demands made.

With a view to absolutely avoiding strikes and securing as harmonious relations as possible between employers and workmen a new organization has recently been started at Deering, a manufacturing suburb of Chicago. Its objects and principles are so different from those of most labor unions that it seems worthy of special notice, inasmuch as it proposes to adjust all grievances in a spirit of friendliness toward capital. It is well called the Progressive Order of American Workmen. Its constitution declares the object of the order to be "promotion and maintenance of harmony and good will between employer and employee, and the protection of their common interests from injury by 'strikes' or any other riotous labor demonstration not in harmony with the civil government of the United States." In order to keep out the foreign elements of anarchy and socialism the constitution provides that none but American citizens of legal age are eligible to membership. It will be observed that citizens of foreign birth are not excluded—only foreigners not naturalized. Provision is made for the care and cure of the sick, burying the dead and the relief of widows and orphans.

The mission of this order is proclaimed by its founders to be that of peacemaker, as they believe that in most cases employers and employees can be reasoned with and difficulties can be completely settled without strikes. Arbitration and moral suasion will be relied upon to win peaceful victories, but in case they fail, the employee or employees

affected will retire and be supported by the order until he or they secure other employment. The other men will not be obliged to leave their places to force employers to terms, nor will the boycott be used. An attempt will be made to benefit labor in a reasonable, sensible, business-like way, with a full recognition of the fact that the laws of supply and demand apply to labor as well as to any other commodity in the market. To those familiar with labor movements these principles may seem Utopian and too mildly drawn to be attractive to pugnacious workmen who will insist on having their own way, whether they secure it by peaceful or forcible measures. But the leaders of this new order are encouraged by the formation of a strong local organization at Deering to endeavor to push the movement into greater prominence, hoping that it may become of national importance and be of great value in bringing about more harmonious and mutually profitable relations between all classes of employers and workmen.

### Some English Railway Cases.

The Interstate Commerce Act of February 4, 1887, marks a new era in the transportation history of the United States. Whether that act be modified by Congress or allowed to continue substantially unchanged, it is at least certain that for the future there will be more or less regulation by government of railways and water carriers. Although this act is the first law upon this subject passed in this country, yet the causes which led to its passage long since compelled legislation in foreign countries. The conditions of mercantile and political life in England are nearest to our own, and therefore it will be interesting to note some of the decisions and results brought about by the English regulation of railways acts of 1854, 1868 and 1873.

It is a good point that the rates of freight and conditions imposed must not be arbitrary, but founded on reason and capable of demonstration. Further, these must conform as near as may be to the necessities of the trade whose product is carried. Fish for the London market was carried from Yarmouth in baskets. The Great Eastern Railway made rates upon this traffic thus: 18 pounds, 3d. per package; 28 pounds, 4d.; 42 pounds, 6d., and 56 pounds, 8d. per package. A Yarmouth trader had built up a special trade in baskets weighing 20 pounds, and was charged thereupon the rate for a 28 pound package, because over 18 pounds. The company declined to arrange the matter, saying that what was fair for one was fair for another, and that the trader could make the size of his baskets conform to their schedule. On trial the trader proved that the size and weight of his baskets could not be altered without injury to his business, and on the other hand the company could not bring forward any definite facts to show any additional expense or trouble to carry 20 pounds than 18 pounds. It was held by the court that while the railway were right in charging generally higher rates for larger and heavier packages, they were also bound to grade their rates in conformity to the necessities of trade, and it was ordered that the 18-pound limit be advanced to 21 pounds, so as to include the complainant's shipments at the lower rate. There is no reason to doubt the soundness of this decision nor its applicability to our own country.

The classifications in use are often indefensible. Almost every trade can show instances where the raw material is carried as cheaply as the finished product, or of several articles substantially the same, one will be given a more favorable place than another in the schedules. In the iron trade and in the many articles made from iron, there is room for much difference of opinion as to the exact freights which should justly be applied. No doubt our railway managers have made efforts to solve these difficult questions fairly, but action often "takes the line of least resistance" without reference to exact justice. Now, at least, the railways must show good ground for anything they do, and shippers of articles not justly classified can obtain an impartial opinion with little trouble.

Competition between railways for the traffic of any particular firm or firms is not an excuse for charging some other firm a higher rate. The charge of the London and Northwestern Railway for cartage and terminal expenses at one of their stations was 1/9 per ton. A rival railway ran through the town, and connected with it by side tracks were two breweries, which consequently had no terminal charges to pay. In order to secure their traffic from its rival, the Northwestern Railway carted and loaded their beer gratuitously, while still charging 1/9 per ton to other brewers not so favorably situated. It was held by the court to be an undue preference, and that an injunction should issue. In order to justify a difference made by a railway company in favor of one or more of their customers, it is necessary that some special consideration be shown, such as a definite decrease in cost of service on these special shipments. It is not sufficient that the railway company wish to attract traffic from a rival line; the few must not receive favors prejudicial to the many. A somewhat similar case was carried to the House of Lords and decided to the same effect—that the question whether in this way a railway can equalize their capacity for competing with other lines is exactly what Parliament has not left open to railroad companies to judge of.

The question of the competition between factories having side tracks and those having none has at times been a serious one in America. In many cases the railroad managers have maintained the justice of equalizing the disadvantages of their respective lines for the payment of cartage charges to firms located at a distance from their tracks and near some rival road. If we consider the English cases authoritative, it follows that such equalizations are wrong, being undue preferences in favor of certain shippers and against that factory or store which may be situated midway. A railroad cannot in any way, by payment of cartage or otherwise, grant a favor to one manufacturer which they are not in duty bound to grant to every other. Competition cannot be pleaded as a reason for injustice.

Another matter touched upon in some English cases is "competition of interest," by which is meant, not merely where the goods are exactly alike, but also where dissimilar goods enter into more or less competition with each other; probably covered in our law by the phrase "like kind of traffic." A good illustration is the case of the Nithail Coal Company vs. Caledonian Railway. The railway had two sets of rates on coal, one for canal and a lower for common coal; the complainants using canal coal for making gas. It was shown that the gas produced from common coal was inferior in quality to that produced by canal coal, but that often both were mixed, and that in different degrees both kinds of coal were used in the manufacture of gas. It was held by the court that the two kinds of coal had enough in common, fairly and commercially, to be competitive, and that the two should be carried at the same rate.

While the English decisions are in the line indicated, the questions under "competition of interest" have been much debated in the United States, and may in the near future assume great importance. The Union Pacific Railway made rates upon ore, varying according to its value and its tariffs have, in respect to this feature, received severe criticism. The English coal decision is based upon the assumption that a railway has no right to take values into account in fixing rates upon the same or like kind of property, because the laws of supply and demand would adjust consumption and prices without their interference. Our continental roads, on the other hand, assert the justice of the principle, that a railway is entitled to share in the prosperity of its patrons, and that the easiest way to arrange this is to tax the mines according to their value—a sort of modified Henry George theory, which finds favor among some railroad men. At some future day this same question may be raised—regarding grain, for example. There are instances where there is a real competition of interests between wheat and corn, and every trade can show similar cases. It is interesting to note that the English railways are entirely against any variations of rates for differing values, where this identity of interest can be established.

### China and the United States.

The Chinese Government has made important concessions to a syndicate of American capitalists, and Count Mikiewicz, who arrived in San Francisco a few days ago accompanied by an imperial envoy, will shortly present autograph letters from the Viceroy, Li Hung Chang, defining the privileges granted, with the object of binding China and the United States in closer friendship. The principals named are Count Mikiewicz and Wharton Barker, of Philadelphia, who is to ratify the agreement in Peking. In substance the documents are as follows: A national and international amalgamated bank is to be formed under an imperial charter, giving sole and exclusive rights as far as regards the Chinese imperial and provincial governments. The bank to be supplied by America and China with capital of 50,000,000 taels, in proportions to be fixed hereafter, but the larger share to be mainly American. It will establish itself in Chinese commercial centers. It will have branches in all foreign cities with which China has trade or political interests. It will have the sole right to coin money. It will receive and disburse imperial and provincial treasury funds. It will carry on the finances of the imperial and provincial governments. It will act, in fact, in a large sense on the Credit Mobilier system. It will advance funds and construct railways, telegraphs, canals, river improvements and systems of drainage. It will take part in building forts, camps, fleets, armies, arsenals, navies and public works. The syndicate is to take over existing government telegraph lines and to have exclusive right for 50 years to manipulate telephones. In addition to the above it is remarked that the Count is authorized to place orders for the construction of several steamships with builders in the United States.

The information thus given bears the marks of authenticity. In fact, the general details were made public some days ago in Philadelphia, through Mr. Wharton. If the grand expectations thus held out should prove to be no mere illusion, their realization will signalize a triumph for the United States—far greater than could have been achieved by the most brilliant success in war, and this despite the intrigues of English, French and German diplomats, of whose movements the State Department at Washington is by no means ignorant. Not

the least of the consequences which may grow out of the compact delineated as above is the possible opening of a market in the East for the silver production of Nevada, Colorado, California and other mining regions on the Pacific. Such a result would be an unexpected deliverance from the silver incubus.

### The World's Merchant Navy.

Lloyd's Universal Register has recently been published, showing the number, species, and capacity of the commercial marine of nations, as it stood entered on December 31, 1886, as compared with the status of December 31, 1885. The general fleet was composed as follows:

Steamers.				
	1885.		1886.	
	Num-ber.	Ton-nage.	Num-ber.	Ton-nage.
Iron.....	8,101	8,975,139	8,108	8,911,405
Steel.....	693	905,725	779	1,306,982
Composition.....	103	32,010	109	32,820
Wooden.....	805	856,397	892	880,655
Total.....	9,642	10,391,241	9,969	10,581,843

Sailing Vessels.				
	1885.		1886.	
	Num-ber.	Ton-nage.	Num-ber.	Ton-nage.
Iron.....	1,936	2,689,177	1,950	2,678,777
Steel.....	65	88,179	82	102,519
Composition.....	109	131,050	116	144,824
Wooden.....	23,365	8,606,225	22,553	8,104,060
Total.....	25,765	11,216,615	25,103	10,411,801
Grand Total.....	35,407	21,607,856	35,124	20,993,644

### Sailing Vessels.

The steamers increased in number last year by 327 and the tonnage 240,602, sailing vessels showed a decrease in number of 612 and in tonnage of 804,808, the total decrease in the number of vessels afloat being 284 and of tonnage 554,206. The wonder is that with the still depressed freight rates the decrease was not greater. The increase in the number of steel steamers, and to some

While steamers increased in number last year by 327 and the tonnage 240,602, sailing vessels showed a decrease in number of 611 and in tonnage of 804,808, the total decrease in the number of vessels afloat being 284 and of tonnage 534,206. The wonder is that with the still depressed freight rates the decrease was not greater. The increase in the number of steel steamers, and to some extent even in steel sailing vessels, with a correspondingly greater joint tonnage, deserves special attention, and under this head the present and coming years will not unlikely exhibit more important changes. Through its lessened cost and its greater durability steel has begun to be adopted in place of iron and other material, as is shown in private naval construction. The underwriters will, we presume, be glad of it, and will no doubt stimulate the tendency in favor of steel by fixing lower rates of insurance on vessels so constructed.

The following table shows the countries having afloat over 10 steamers:

	1885.		1886.	
	No.	Tonnage.	No.	Tonnage.
England	5,080	6,162,117	5,067	6,169,065
Ditto Colonies	692	877,906	735	429,906
Together	5,772	6,359,023	5,792	6,598,971
France	508	738,141	500	742,662
Germany	559	608,917	679	654,114
United States	388	485,392	400	505,677
Spain	421	361,006	401	350,912
Italy	153	19,305	173	290,342
Holland	142	190,445	152	175,476
Russia	209	151,360	212	153,329
Sweden	421	149,794	437	15,788
Denmark	236	142,399	300	140,000
Norway	282	140,427	287	142,185
Austria	115	131,461	123	145,511
Belgium	63	99,584	68	105,508
Japan	104	77,741	106	77,595
Greece	74	53,872	82	60,839
Brazil	56	42,917	141	62,060
Chile	40	41,851	45	41,580
China	23	32,419	27	37,319
Turkey	32	27,119	30	54,697
Portugal	25	21,976	27	23,336
Mexico	15	16,975	15	17,664
Arg. Republic	17	8,681	48	17,069
Hawaii	30	7,963	21	10,969
Other countries	47	21,258	50	24,820
Total	9,642	10,391,241	9,969	10,581,843

### Sailing Vessels.

	1885.		1886.	
	No.	Tonnage.	No.	Tonnage.
England	5,114	8,318,867	4,881	8,546,148
Ditto colonies	2,767	1,370,602	2,559	1,097,147
Together	7,881	6,359,023	7,440	3,943,295
United States	3,542	1,387,140	3,427	1,530,490
Norway	3,369	1,351,985	3,240	1,345,387
Germany	1,794	806,197	1,678	769,977
Italy	1,674	701,263	1,979	719,257
Sweden	1,130	391,061	1,079	312,821
France	1,194	318,712	1,082	286,665
Greece	1,231	286,385	850	269,525
Russia	931	270,940	914	271,849
Holland	542	228,608	514	211,732
Austria	375	194,189	350	175,821
Spain	655	159,116	635	150,111
Denmark	658	127,569	648	125,189
Chile	119	64,174	136	65,653
Portugal	214	51,040	207	52,092
Japan	130	31,692	105	35,563
Turkey	102	22,830	72	11,928
Brazil	116	30,401	85	78,060
Siam	16	6,404	16	6,414
Arg. Republic	23	5,637	40	8,673
Peru	18	5,773	18	5,873
Other countries.	42	13,244	41	22,308
Total	25,766	11,216,615	25,155	10,411,807

It will be noticed that while England and several other leading maritime nations have experienced a notable decrease in the number of sailing vessels, a few less important countries have materially increased them.

### Steamers and Sailing Vessels Combined.

	1885.		1886.	
	No.	Tonnage.	No.	Tonnage.
England .....	10,439	9,410,924	9,938	9,051,213
to colonies .....	18,154	1,754,108	8,204	1,528,653
Together .....	18,156	1,165,092	18,152	1,058,169
United States .....	3,383	2,083,093	3,827	2,043,167
Germany .....	3,051	1,492,413	3,487	1,447,532
France .....	2,832	1,011,111	3,000	1,050,000
Spain .....	1,762	1,065,552	1,991	1,029,337
Italy .....	1,287	900,588	1,852	948,190
Prussia .....	1,066	520,152	1,028	575,005
Sweden .....	1,501	442,852	1,018	471,009
Denmark .....	1,142	382,310	1,055	400,000
Netherlands .....	694	419,113	666	387,298
Belgium .....	1,325	313,257	941	340,854
Austria .....	490	325,670	473	322,352
Portugal .....	254	169,418	250	169,000
Spain .....	254	169,418	250	169,000
Italy .....	159	106,025	169	108,193
Germany .....	72	104,967	78	111,085
Prussia .....	72	73,017	75	78,000
France .....	392	633,218	400	333,140
Spain .....	194	48,000	711	196,625
Italy .....	25	32,474	87	37,907
Portugal .....	19	19,143	21	20,000
Belgium .....	40	14,313	73	25,794
Denmark .....	25	18,068	29	11,454
Netherlands .....	10	2,280	26	13,242
Austria .....	10	7,461	30	7,441
Other countries .....	41	15,820	57	20,338
Total .....	35,058	21,507,856	33,124	20,943,650



flag a Scandinavian Union Jack, the number of vessels would have been 5202 in 1885, with a joint tonnage of 1,973,268, and in 1886, 5003, with 1,910,131 tons, thus numbering more than the United States, and in tonnage following next to them. There are so many sailing vessels built in Norway because the coast line is long and the country thickly wooded, wages are low, the timber well fitted for the construction of sailing vessels, and the nation, owing to its extensive cod-fish catch, has at all times been a bold seafaring one. Vessels are mostly built on shares, in which small peasant capitalists participate, and the captain is interested. This will explain the important position which Scandinavia occupies as a ship-owning people, and Norway in particular. They navigate cheap vessels at a comparatively small cost, and this accounts for the magnitude of the Scandinavian commercial fleet.

#### Chicago's Growing Manufactures.

In the absence of official and authentic figures, such as those of the United States census, it is impossible to state accurately, or even approximately, the rate at which the manufactures of a community are growing. But in the case of a city like Chicago, whose industrial development is proceeding at a prodigious pace, it is not necessary to have exact figures of comparison in order to appreciate the progress which is being made. The evidences of the movement are apparent on every hand. Not only are new buildings being erected in the city and its suburbs to be occupied by individual enterprises, and extensions being made to old works for the purpose of enabling them to handle the increased business offering, but a notable movement is in progress, involving small concerns with limited capital. Numerous buildings in various parts of the city now shelter clusters of small undertakings, receiving power from a common engine. Some of them occupy but a single room. In this humble way manufacturers of all kinds of useful articles are entering upon independent careers, animated with the hope that some day their business may grow to such proportions that they can have a whole factory of their own. Even basements are utilized for establishments of a character wholly unexpected in such places. Machine shops, rapidly establishing reputations for good workmanship, exist in these uninviting quarters, selected partly for cheapness of rent and partly for convenience of location. In certain localities of the north, the west and the south side of the city, especially in the immediate vicinity of the Chicago River, there are whole blocks occupied by manufacturing establishments, the variety of whose products would be highly creditable to an Eastern city of industrial prominence.

Although many large manufacturing concerns are located within the built-up portion of the city, including even blast furnaces and steel rail mills, the tendency now is to locate large works, and those handling heavy materials in the suburbs, where unoccupied land can be had in large tracts. Pullman, Hegewisch, Cummings and South Chicago, are now old examples of this movement, although in each of them new enterprises are given birth with sufficient rapidity to show that they are not past the period of fecundity in industrial growth. Other manufacturing suburbs are springing up to claim attention with those which have now become so well known, and establishments of such magnitude are under construction or projected as will in time cause these present obscure hamlets to be also well known in industrial circles.

If the ambitious enterprises which are contemplated or are now under construction in the vicinity of Chicago for the manufacture of iron and steel are developed according to the plans of their projectors, that city will in a few years nearly double its present large production. Plans are on foot for the erection of works to manufacture structural shapes of all kinds, and plates and sheets, in addition to steel rails and ordinary merchant forms. At present bridge and building iron and steel, and all kinds of plates and sheets have to be procured from other manufacturing points, although the local demand has for years been large enough to justify the establishment of works to make these products. To supply the raw material that will be needed for such extensive requirements, blast furnaces are also projected, and if no serious reverse overtakes the iron trade during the next 12 months there is a strong probability of their erection being undertaken. As it stands to-day, Chicago is a most remarkable example of what American enterprise can accomplish, but the fact seems also to be apparent that its industrial importance is but an indication of a more brilliant future.

The iron and steel trade is undergoing the questionable distinction of attracting a share of the "enterprise" of the daily press. The result is a series of interviews and editorial discussions, which bring out a wonderful collection of information. One authority is quoted in the weekly financial report of the New York Times as follows: "The iron trade will paralyze after the present contracts for steel rails are completed, which will take all this year; and I venture the prediction that the production of iron in 1888 will decrease 2½ millions of tons. A million less steel rails will be required, because there will not be a mile of

new road built in the district north of Mason and Dixon's line, south of St. Paul, west of the Alleghenies, and east of the Rocky Mountains. This about covers all the territory in which lie the valuable roads of the United States." Almost simultaneously New York was the center from which was radiated all over the country the flood of light shed upon the situation by Mr. W. D. Marvel, an importer of iron ore, who, among other things, is reported to have put himself on record as follows: "One reason for big imports is that, with few exceptions, the ores of the United States are not suitable for making steel rails. There is an enormous demand for rails, both for building new roads and for making light, worn-out tracks heavier. Heavier rails are coming into use, and all the roads will have to put them down sooner or later. The demand for rails, I think, will far outrun all possible sources of supply for the next 10 years, and the collapse of iron and steel industries here is impossible." Such a conflict in the opinion of "authorities" is well calculated to prove bewildering to those who are not directly connected with the trade. Both are too obviously erroneous to need contradiction, and will only increase the doubts with which the business community will receive any statements of facts or of opinions which daily newspapers put forward concerning any of the great industries of the country.

#### The Condition of the Iron Trade.

To the Editor of The Iron Age: For some reason the New York Tribune seems for the past few days to take a special delight in publishing damaging statements concerning the iron trade, and if I were not a reader of your valuable paper I should be inclined to believe these items and feel correspondingly depressed. I find, however, that the production of iron in this country has increased so that if our year were extended but 11 weeks our capacity would equal that of Great Britain for a year. On the other hand, the consumption of iron in the South has so grown that in some markets there has been a demand for Southern iron which could not be supplied. In addition to this, Southern railroad business has increased to such an extent that those roads require 5000 more cars at the present time.

Your issue of the 25th inst. says: "Gradually the managers of our great trunk lines, at least, are reaching the conclusion that the rapid increase in the weight of rolling stock calls for heavier rails." An increase of but 12 pounds to the yard would mean 22 tons more per mile than is now used on many roads. If the recent disaster at Chatsworth calls public attention to wooden bridges, so that people refuse to patronize those roads thus equipped, some way will be speedily found to replace them with iron, and as in the State of Illinois on 17 railroads alone there are 268 iron and stone against 5605 wooden bridges, this change will largely increase the consumption of iron. Even in our own State on 19 railroads there are 1633 iron and stone against 3563 wooden bridges.

We must not overlook the fact that recently large contracts have been given out for Government vessels to be built here, and, what is more encouraging, samples of plate were submitted which stood the most rigid tests. The urgent call for fire proof edifices has made it necessary that large amounts of iron should be used in every building of any magnitude; this will also cause an expansion of consumption from year to year. Neither must we forget that our country has grown marvelously within the past 10 or 12 years; its wants are much greater, so that the market is not so easily upset by the importation of even 100,000 tons of iron as it would have been then, and to-day, in spite of the large increase in production, there are few if any points where there is an accumulation of pig iron. It is well to be prepared in advance for any change that may come. Outside of New York and Philadelphia, the reports are very encouraging, and even in those two cities trade is fairly steady in spite of foreign importations. It is no great cause for alarm that steel rails for winter delivery are quoted at \$35 per ton at tide, as the makers are willing to sell at a reduction at a time when but little work can be done on the roads. Yours truly, EQUIT.

NEW YORK, August 29, 1887.

#### The Failure of Robert Hare Powell and Pennock & Co.

On the 29th ult., Robert Hare Powell & Co., one of the largest bituminous coal operators of Pennsylvania, and the firm of Robert Hare Powell's Sons & Co., proprietors of the Saxton furnaces, issued the following circular:

"The inability of the firm of Charles E. Pennock & Co. to meet their paper maturing to-day, of which we are this morning apprised, has made it necessary for us in the interest of our creditors and ourselves to make an assignment. We have accordingly conveyed our property and claims to the Guaranty Trust and Safe Deposit Company, of this city. The indebtedness of the two firms is estimated at \$1,575,000. The assets are estimated at over \$4,000,000. We do this at a time when we might at some loss and risk continue our business, but we believe it wiser to place our affairs in such a shape as to secure not only those to whom we are indebted, but also to ourselves, a valuable property. Our object is to secure an extension, and this, if granted, will enable us, we believe, to pay all that is due, principal and interest. Our paper has not been protested, and our wages accounts are settled up to last settlement date. We propose to send you a statement exhibiting our assets and liabilities in a short time. As our property is extensive, in use at many places, and should be appraised by disinterested experts, we cannot expect to have a detailed description of it prepared at once, but the work is progressing, and we will, we think, have one ready

in 20 days. In the meantime, we herewith report to you the preliminary estimate made up from our books to-day. We are advised that you are by our present action more fully protected than you could be in any other way, and we ask your indulgence for the time necessary for us to make the exhibit above proposed, and a proposal of terms of settlement."

The failure was caused by the inability of Pennock & Co., of Coatesville, to meet paper to the extent of \$203,000, for which they received judgment. The following have been appointed appraisers: B. Andrew Knight, of Philadelphia, of the Huntingdon and Broad Top Railroad Company; J. Simpson Africa, Edward McHugh, Edward Colt, of the Reading Iron Works; W. B. Knott and Alexander Post, of Huntingdon. The court records at Huntingdon show a mortgage of \$750,000 against the estate in Huntingdon and Bedford Counties, \$350,000 of which was negotiated by the elder Powell. The remaining \$400,000 was loaned for the purpose of building a new furnace at Saxton, and of improving the property, constructing railroads to the ore and coal mines, and for building houses. The mortgage was put on record April 22, 1886, and is in favor of the Iron Trust Company, of Philadelphia, as trustees for the stockholders. The lands owned by the firm in Huntingdon County consist of 3000 acres of ore land at Dry Hollow, in Warriors Mark Township. Near Dudley and Coalmont they own several thousand acres of valuable coal lands. At Powelton, in Centre County, they own 600 acres of land. In Bedford, 4000 acres of ore land, some coal land, five limestone quarries, and railroads to all their mines from the furnace at Saxton. In Westmoreland County there are 150 acres of gas coal, with a 6 foot vein in the clear, worth \$150,000, and 160 acres in Bridgeport, Ohio, opposite Wheeling, W. Va., worth \$500 an acre. At Sterling, Clearfield County, they own 335 acres of coal land and have a lease with the Long estate on 1400 acres for 50 years at 10 cents per ton, with a capacity of 2000 tons a day. At Ramey they own another large coal tract and 50 houses.

It was the intention of the firm to put their new furnace into blast at Saxton on September 10. They expended a large sum of money in its construction, and had arranged to sell their full product from both furnaces a long time ahead. The Valley Iron Works of C. E. Pennock & Co., Coatesville, makers of plates, were built in 1837, and contained five double puddling furnaces, four heating furnaces, one 4 ton hammer and one 18 inch, one 24 inch and two 30 inch trains, the annual capacity being rated at 7000 net tons. It will be observed that this mill is very small, and that the sums which might be required to carry them, as far as supplies of pig iron and coal are concerned, will not account for the large amount of paper carried for them.

#### WASHINGTON NEWS.

##### The Wire-Rod Case—Undervaluations and the New York Custom-House—Our New Navy.

(From our Regular Correspondent.)

Assistant-Secretary Maynard is still engaged in his investigation of the papers submitted in the wire-rod controversy. He finds some nice points of law and logic involved, and therefore is giving the subject very careful attention. It will be some days before he will be ready to announce his conclusions. The importers, backed by strong influences among the domestic wire manufacturers, are making heroic efforts in the way of pressure to bring about what they seem to doubt will be the natural outcome of their arguments. Their case is not strengthened by any such processes, as the Assistant Secretary in his examination of undervaluations has obtained an insight into the methods of alien importers which would have the effect of reducing their opportunities to the smallest margin. Mr. Maynard says that his wish in all cases of dispute is to execute the statutes in the interests of American industry and labor. His construction of the law in regard to wire rods will therefore take that direction. The complicating feature of the controversy is the strength and importance of the American consumers of these rods.

It is not improbable that the Government investigation of the undervaluation abuses will result in a thorough overhauling of the personnel of the appraiser's department of the New York Custom-House. It was significantly remarked in authoritative quarters that no changes had yet been made in that direction. It has been shown that the great obstacle to the full execution of the laws is the determined attempts to continue old methods. From all the evidence, the appraisements have been more on the side of the protecting interest than of the protection of home industry. It looks as if the Department was about satisfied that to accomplish reforms it will require more vigorous treatment than mere letters of instructions to collectors. Instead of facilitating the efforts to put a stop to the practical nullification of the customs laws by undervaluations, there seems to exist a very noticeable indifference among those who have all to do with the details of prevention. The abolition of the use of *pro forma* invoices has had some effect in stopping the systematic fraud perpetrated by foreign importers, but the Department will go further before the evils of undervaluation are entirely eradicated.

Secretary Whitney is expected back in a few days for a short stay. In a recent conversation as to the prospects of liberal appropriations for the coming Congress for more ships he said that he would urge going on with the work, but that it would not make much difference if Congress would let a year or two go by so that we could see what the ships we are now building can do. When finished, he says, they will make a respectable showing for a beginning, even if we had no new one put under way in the interval. There is no doubt, however, of an effort to pass some of the bills footing up into the scores of millions for steel ships and steel fortifications. The partisan rivalry for campaign capital will force that issue between

the two sides of the legislators of the nation.

The new board for the superintendence of the tests of steel for the new ships is getting its affairs into shape. The new rules and character of tests have already been printed in *The Iron Age*.

#### Edison's Latest Invention.

At the last meeting of the American Association for the Advancement of Science, Thos. A. Edison described in detail what he calls the pyromagnetic motor. The following is an abstract from his paper:

The production of electricity directly from coal is a problem which has occupied the closest attention of the ablest inventors for many years. Could the enormous energy latent in coal be made to appear as electric energy by means of a simple transforming apparatus which accomplishes its results with reasonable economy, it will be conceded probably that the mechanical methods of the entire world would be revolutionized thereby, and that another of those grand steps of progress would be taken of which the nineteenth century so justly boasts. It has long been known that the magnetism of the magnetic metals, and especially of iron, cobalt, and nickel, is markedly affected by heat. According to Becquerel, nickel loses its power of being magnetized at 400°, iron at a cherry red heat, and cobalt at a white heat. Since, whenever a magnetic field varies in strength in the vicinity of a conductor, a current is generated in that conductor, it occurred to me that by placing an iron core in a magnetic circuit and by varying the magnetizability of that core, by varying its temperature, it would be possible to generate a current in a coil of wire surrounding this core. This idea constitutes the essential feature of the new generator, which, therefore, I have called a pyromagnetic generator of electricity.

The principle of utilizing the variation of magnetizability by heat as the basis of electric machines, though clearly applicable to generators, was first applied to the construction of a simple form of heat engine, which I have called a pyromagnetic motor. A description of this motor will help us to understand the generator subsequently constructed.

Suppose a permanent magnet, having a bundle of small tubes made of thin iron placed between its poles, and capable of rotation about an axis perpendicular to the plane of the magnet, after the fashion of an armature. Suppose, further, that by suitable means, such as a blast or a draft, hot air can be made to pass through these tubes so as to raise them to redness. Suppose that by a flat screen symmetrically placed across the face of this bundle of tubes and covering one-half of them, access of the heated air to the tubes beneath it is prevented. Then it follows that if this screen be so adjusted that its ends are equidistant from the two legs of the magnet, the bundle of tubes will not rotate about the axis since the cooler and magnetic portions of the tube bundle—i. e., those beneath the screen—will be equidistant from the poles, and will be equally attracted on the two sides. But if the screen be turned about the axis of rotation so that one of its ends is nearer one of the poles and the other nearer the other, then rotation of the bundle will ensue, since the portion under the screen, which is cooler and therefore magnetizable, is continually more strongly attracted than the other and heated portion. This device acts, therefore, as a pyromagnetic motor, the heat now passing through the tubes in such a way as to produce a dissymmetry in the lines of force of the iron field, the rotation being due to the effort to make these symmetrical. The guard plate in this case has an action analogous to that of the commutator in an ordinary armature. The first experimental motor constructed on this principle was heated by means of two small Bunsen burners, arranged with an air blast, and it developed about 700 foot pounds per minute. A second and larger motor is now about finished, which will weigh nearly 1500 pounds, and is expected to develop about 3 horse power. In both these machines electro-magnets are used in place of permanent magnets, the current to energize them being derived from an external source. In the latter machine the air for the combustion is first forced through the tubes to aid in cooling them, and then goes into the furnace at a high temperature.

The construction of a machine of sufficient size to demonstrate the feasibility of producing continuous currents on the large scale in this way has only just been completed. The new machine consists of eight distinct elements, each the equivalent of the device already mentioned, consisting of the two legs of an electro-magnet somewhat far apart (12 inches actually), having at one end the ordinary yoke, and at the other a roll of corrugated sheet iron, 0.005 inch thick, called an interstitial armature; this armature having a coil of wire wound upon it, and separated from direct contact by means of asbestos paper. The eight elements are arranged radially about a common center, and are equidistant; the eight interstitial armatures passing, in fact, through the iron disks which constitute the common pole pieces of all the electro-magnets. The coils wound upon the interstitial armatures are connected directly in series, the whole forming a closed circuit. Through the center of these disks a hollow vertical shaft passes, carrying at its lower end a semicircular plate of fire-clay called a guard plate, which, when the shaft is turned, revolves close to the lower ends of the sheet iron armatures and screens off half of them from the access of heat from below. The shaft carries a cylinder of insulating material, having metallic contact pieces let into it on opposite sides, the line joining them being parallel to the straight edge of the guard plate. Upon this cylinder eight springs press, each of these springs being connected to the wire of the closed circuit above mentioned midway between the coils. The length of the metallic segment is so proportioned that the following spring touches it just as the preceding one leaves it. The springs themselves are so adjusted that each of them comes into contact with its metallic segment just as the

preceding coil of the pair to which it is connected is uncovered by the rotation of the guard plate. Upon the same shaft, and above the cylinder just mentioned, a pair of metallic rings are placed, insulated from the shaft, to each of which one of the metallic segments is connected. Brushes pressing upon these rings take off the current produced by the generator.

The entire machine now described is placed upon the top of any suitable furnace, fed by a blast, so that the products of combustion are forced up through those interstitial armatures which are not covered by the guard plate, and raise them to a high temperature. The field magnets when charged magnetize of course only those interstitial armatures which are cold—i. e., those beneath the guard plate. On rotating this plate, the interstitial armatures are successively uncovered on the one side and covered on the other, so that continually during the motion, four of the eight armatures are losing heat and the other four are gaining heat. But those which are losing heat are gaining magnetism, and *vice versa*. Hence, while currents are generated in all the armature coils, since in all the magnetism is varying, the current in the coils beneath the guard plate will be in one direction, while that in the coil exposed to the fire will be in the other. Moreover, whenever an armature passes out from under the guard plate, its condition at once changes; from losing heat and gaining magnetism, it begins to gain heat and to lose magnetism. Hence, at this instant, the current in its coil is reversed, and consequently the line connecting this coil with the one opposite to it constitutes the neutral line or line of commutation, precisely as in the ordinary dynamo.

The results thus far obtained lead to the conclusion that the economy of production of electric energy from fuel by the pyromagnetic dynamo will be at least equal to, and probably greater than, that of any of the methods in present use. But the actual output of the dynamo will be less than that of an ordinary dynamo of the same weight. To furnish 30 16 candle lights in a dwell house would probably require a pyromagnetic generator weighing 2 or 3 tons. Since, however, the new dynamo will not interfere with using the excess of energy of the coal for warming the house itself, and since there is no attendance required to keep it running, there would seem to be already a large field of usefulness for it. Moreover, by using the regenerative principle in connection with it, great improvement may be made in its capacity, and its practical utility may very probably equal the interesting scientific principles which it embodies.

The Pennsylvania road has been pursuing a policy with reference to its roadbed which the managers of other trunk lines are watching with wary eyes. The ballasting of the road with rock has been going on for years. Within a comparatively short time, under the direction of President Roberts, the curves have been gradually disappearing wherever it was possible to make a straight track. In some instances the engineering feats for the accomplishment of this straightening have been stupendous. The object has been to shorten the line, and to this extent overcome the disadvantages under which the road labors in the matter of heavy grades. President Roberts is quoted as saying that when the curves were taken out to the full extent of his plans he would be able to make some of the other trunk lines feel the Pennsylvania power in the matter of passenger traffic as it has never yet been felt. It is not admitted by all railroad men that stone is the best ballast for tracks. Mr. Toucey, of the New York Central, is one of the conservative railroad men who hold that gravel is the best material for that use. When the magnificent roadbed of the Pennsylvania road is cited as an example of stone ballasting, his reply is, that the Pennsylvania people could not get gravel and therefore were obliged to use stone. The younger men in the railroad business, however, regard stone as superior to gravel.

In our recent review of the consolidation Gogebic iron ore mining interests, we did not sufficiently emphasize the fact that among the properties acquired by the Lake Superior Consolidated Company are those in the Mesnominie region, the Florence, Youngstown and Iron River Mines. Their magnitude will be appreciated when we state that this year up to the 17th inst., these mines made the following shipments: Florence, 45,617 tons, Iron River, 50,936 tons, and Youngstown, 22,471 tons. The only one of the Gogebic mines in the Consolidated Company approaching them is the Kakagon, with 27,642, the Nimikon following with 13,362 tons and the Bessemer, with 4492, the only ship-ers of the group.

From his exhaustive experiments on the strength of wood from cinders, Professor Bauschinger concludes that the maximum crushing resistance is attained by this variety of timber in one year after felling. It further appears that the amount of moisture contained in the wood has a marked influence on both its density and crushing strength, which qualities, according to the professor, form the best basis for estimating the value of the timber.

On the 24th ult., the Quincy Wheel broke its two main shafts, two large fly wheels and four pillar blocks. This damage, besides being several thousand dollars, will amount to many more before the break can be repaired, as it will take a month at least to repair.

Gold will only melt at a comparatively high temperature, as we all know, but what is not generally known, the *Jewellers' Journal* says, is that if 2 per cent. of silica be added to the gold, it can be melted over the flame of a common candle. From the same source the reader may learn that a pretty alloy, said to resemble gold exactly, can be made with 16 parts copper, 1 of zinc and 7 of platinum. The copper and platinum are covered first with borax, and then with powdered charcoal and melted, then the zinc added, and the alloy thus produced is exceedingly malleable, and can be drawn into the finest wire, while it never tarnishes.

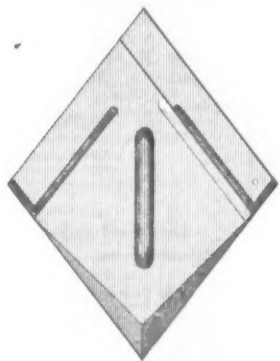






Thorn's Improved Shingles.

We illustrated some time since the sheet-metal shingles or roofing tile introduced by the Thorn Shingle and Ornament Company, of Philadelphia. In the interval, a number of



Thorn's Improved Shingles.—Fig. 1.—New Form of Diamond Tile.

minor improvements have been made in these goods, which are of enough importance to warrant another presentation to the public. The changes that have been made are in the direction of still further improving the laying and weather qualities of the goods,



Fig. 2.—Full Size Section through Groove of Diamond Tile.

while, at the same time, all the desirable features of design and construction in other respects are fully maintained. One of the earliest patterns put upon the market of the series referred to is known as the Diamond Shape Tile, the general appearance of which

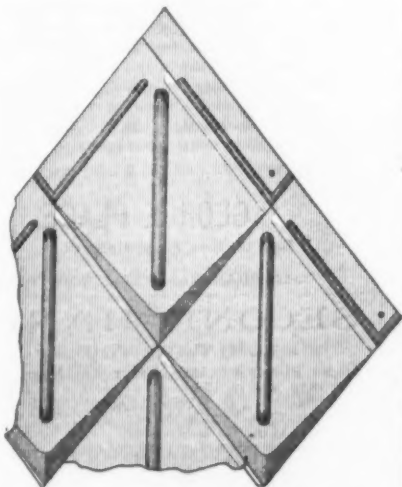


Fig. 3.—Group of Improved Diamond Tile as Laid.

is indicated by the first of the accompanying engravings. The only objection ever raised to sheet metal shingles of this form was the possibility of the point raising from the roof, inasmuch as the means of fastening were nails in the flange, midway of the length of

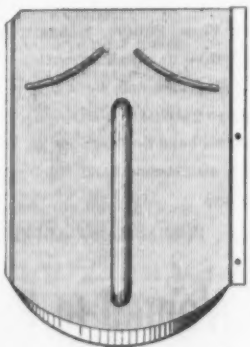


Fig. 4.—Round-Bottomed Tile, with Side Spring Lock.

the shingle. By a recent improvement this objection which, by the way, we never heard practically urged, has been overcome. A folded crease is made in the flange of the lower shingle in such a way as to permit a projecting flange on the overlapping shingle to engage in it. By this means, the entire

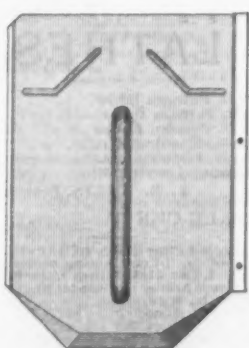


Fig. 5.—Octagon Pattern Tile.

length of one side of the point is securely held to the overlapped shingle, and yet in a way to permit free movement in the way of contraction and expansion throughout all parts of the shingle. The point is so fastened as to make it impossible to have a 'kick-up.'

The other shingles of the series, three of which are illustrated in this connection, are similarly treated; but, instead of the groove or crease above referred to, are finished with the spring lock which has been applied to another shingle made by the same company. This spring lock contributes a finish and constitutes a construction for these goods which will be generally appreciated by architects and builders. A full size section of the spring lock is shown herewith. A peculiarity of the joint made in this way



Fig. 6.—Full Size Section through Spring Lock.

is, that the united shingles are so held together by the lock that they cannot be separated save by sliding them apart endwise. No amount of pull in the opposite direction is sufficient to loosen the joint. At the same time there is ample play for contraction and expansion. We understand that the new form of goods here shown will

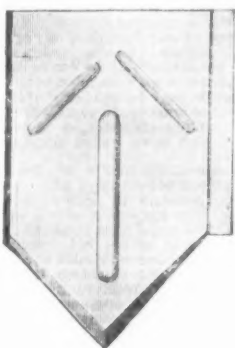


Fig. 7.—Hexagon Pattern Tile.

be rapidly substituted for those heretofore manufactured, a very small stock of which still remains on hand. New dies are in a forward state of completion, and when in operation will be employed to the exclusion of the two old forms.

The company are also introducing the hip roll, illustrated in the engravings presented

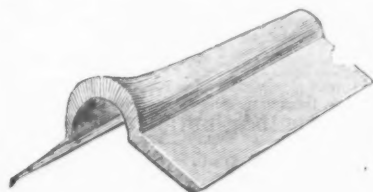


Fig. 8.—Improved Ridge Roll.

herewith. The roll is of the conventional form largely employed about slate and metal roof and the peculiarity consists in the way it is formed. It is struck up in short lengths in dies with a knob end, and so arranged as to lap over the lower course as it is shingled into position, as may be required. Accordingly the ridging may be

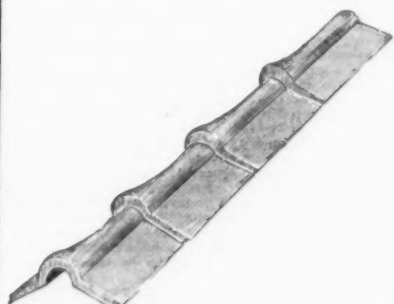


Fig. 9.—Ridge Roll on Building.

used on hips of sharp curve as well as on straight hips. The form imparted to the work by the die causes it to very nearly resemble some of the ridging and hip roofs peculiar to the terra-cotta trade and which constitute a picturesque feature of the spires

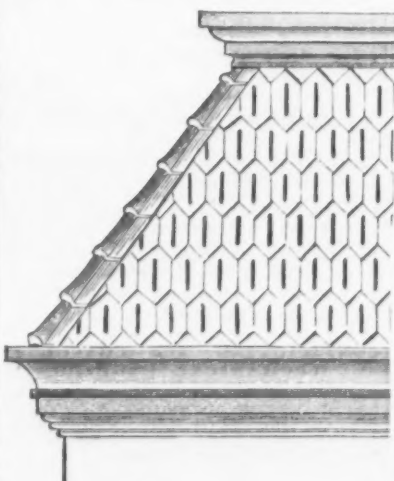


Fig. 10.—Showing Application of Ridging to Mansard Roof.

and steep roofs to which they are occasionally applied. The entire series of roof shingles which the Thorn Shingle and Ornament Company are putting upon the market in many respects resembles patterns with which builders have long been acquainted, growing out of their general employment in slate, earthen tile, terra-cotta work, and, in some instances, shingle work.

Myers' Rope Clamp.

F. E. Myers & Bro., Ashland, Ohio, are the manufacturers of Myers' rope clamp, general views of which are shown in the accompanying cuts. The device, it will be noticed, consists simply of a hook with eye for attaching the rope made of malleable



Myers' Rope Clamp.

iron, the two parts being connected by a swivel, so that the rope will not become entangled or twisted. The peculiar feature of the clamp is the shape of the eye, which is formed in such a way that when one end of a rope is inserted and brought round underneath, as shown in the illustration, any stress upon the other end of the rope serves only to tighten the fastening. The rope and eye, it will be noticed, make practically what is known as a weaver's knot, which is considered a very secure knot. The fastening is easily released, and by pulling the end through the loop the rope can be shortened any desired amount. The manufacturers refer particularly to its usefulness in connection with a horse hay fork, as it does away with the tying of knots, which are liable to become jammed, necessitating the cutting of the rope. The device is also spoken of as serviceable on boats and in other places where it is desirable to fasten a hook to the end of a rope temporarily.

The Perfection Self-Lighting Tubular Lantern.

The Perfection Manufacturing Company, Sixth and Arch streets, Philadelphia, Pa., are offering to the trade the Perfection Self-



The Perfection Self-Lighting Tubular Lantern.—Fig. 1.—Showing Manner of Lighting.

Lighting Tubular Lantern, two views of which are shown in the accompanying illustrations. As the name indicates, the principal feature of this lantern is the method of lighting it. As shown in Fig. 1, there is at the side of the lantern a key or handle, which, when turned, fires a cap of an igniting tape, and thus lights the wick. The light-



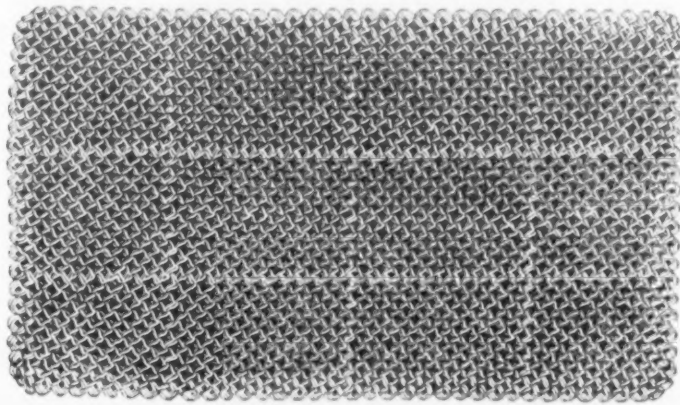
Fig. 2.—Showing Manner of Removing Globe.

ing attachment consists, essentially, of two steel points placed near the wick, and an igniting tape, which is a ribbon made of cloth or paper, and having caps on its surface. When the caps are brought in contact with the steel points, a flame is projected forward to the wick, igniting the oil. The manufacturers, in describing the lantern, refer to its greater convenience, the lessened danger of fire, and the ease with which it can be lighted in a wind. The lantern is in-

tended for the regular O Tubular Globe and Wick, the same as ordinarily used. In size it is 4 to 5 inches shorter and 2 to 3 inches narrower than the other tubular lanterns, which is referred to as making it more convenient to carry and less likely to strike against obstacles. The cost of the lantern is said to be no more than other tubular lanterns, neither does the expense of lighting amount to a greater sum than where matches are used. When it is desired to remove the globe for cleaning or other purposes, the wire finger piece attached to the cover is raised and the globe drawn out, in the way shown in Fig. 2. To replace the globe, it is only necessary to push it back into place, where it will automatically fasten itself.

Union Woven Wire Door Mat.

The Union Wire Mattress Company, 73 to 83 Erie street, Chicago, Ill., are manufacturing two kinds of wire door mats, for which they have applied for patents. The accompanying illustration represents their No. 2 flexible mat. This is made with a woven border, of No. 16 wire, and is double all the way through, thus securing great strength and durability, resisting compression and forming an excellent scraping surface. It has no rods running through it, and is therefore flexible in every direction and can easily be rolled. It is especially adapted for household use, and is made to

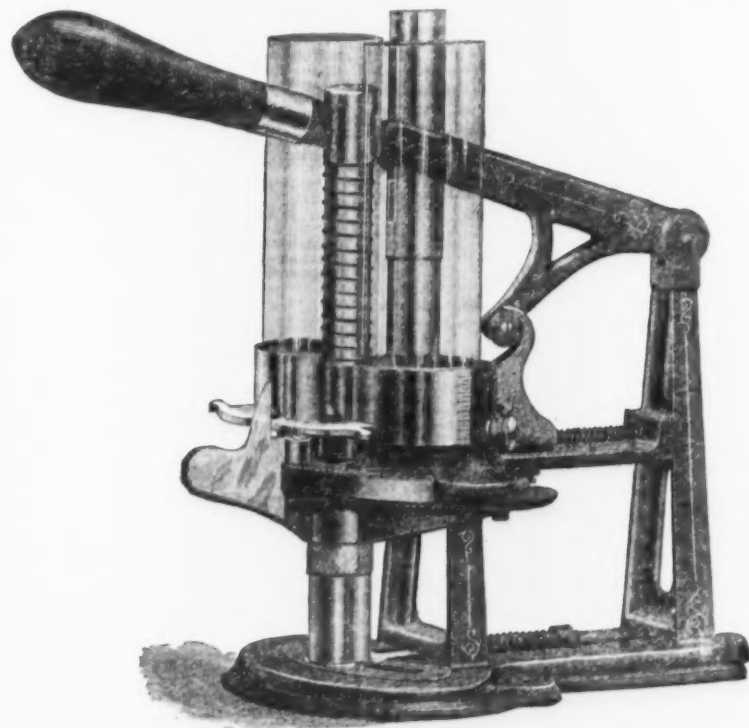


Union Woven Wire Door Mat.

order in any size. The No. 1 mat is made with an iron frame strongly braced, and is recommended for hard usage. Both kinds are made of steel wire and thoroughly galvanized. They are also reversible, both sides being woven exactly alike.

Automatic Cartridge Loader.

Messrs. Bailey, Farrel & Co., 619 Smithfield street, Pittsburgh, Pa., are putting on the market a new automatic cartridge loader, of which we annex an engraving. The device is of few parts, substantially made and not liable to get out of order



Automatic Cartridge Loader, Made by Bailey, Farrel & Co., Pittsburgh, Pa.

easily. With it shotgun shells can be loaded at the rate of from six to 12 per minute, according to the expertness of the manipulator. The machine consists of a powder and shot chamber, with a wad tube or chamber placed between them, the three chambers being mounted on a frame. On this frame and between the chambers the wad plunger is placed. The cartridge is slipped into a swinging carrier mounted under the top plate. In operation the loader is screwed down to a table, with that part of the base having an opening protected by a slide, through which the cartridge is slipped projecting over the edge of the table.

In operation a small trigger is pressed to open the slide at the bottom of the cartridge holder. When the cartridge is in place a supply of powder is admitted by the motion of a small lever, and the large compressing lever is brought down, placing a wad firmly on top of it. Another motion of the small lever just mentioned, in the opposite direction, delivers shot to the shell, and the compressing lever finally places another wad on the charge. With the insertion of the shell the whole operation comprises only five movements, as the loaded cartridge drops out of its own weight when the slide is drawn for the insertion of an empty cartridge shell. Card board, pink edge, black edge, felt, merino or any kind or thickness of wad can be loaded in the shells or any

combination load, as for example, thick felt wad between two thin cardboards on powder and thin cardboard on top of shot. After the compressing lever is pressed down to place a wad in the shell it is only necessary to release the handle. The spring on the wad plunger elevates the lever, releasing a slide, which immediately places a new wad in position under the plunger and directly over the cartridge shell ready for insertion into the shell when required.

The workmen at the limestone quarries, near Youngstown, Ohio, struck on the 23d ult., for an advance of 2 cents per ton for quarrying. They also demand a payday every two weeks instead of monthly, as has been the custom. These grievances are managed independently of the Youngstown blast furnaces, so that the matters in dispute are out of the control of the pig-iron manufacturers. They have experienced no inconvenience from the strike thus far, because they have an ample stock of limestone on hand for immediate requirements, but if the dispute continues for some time there will, of course, be more or less trouble. A new company have been organized for the purpose of quarrying limestone, which will add to the local supply very materially in a short time. It will not be entirely a local matter, however, as the limestone which they quarry will be supplied to pig iron manufacturers in Eastern Ohio, West-

ern Pennsylvania and West Virginia. The company are called the Bessemer Limestone Company, the stock of which is owned by the Brier Hill Iron and Coal Company, The Riverside Iron Works, the Wheeling Iron and Nail Company and the Benwood Iron Works. J. G. Butler, Jr., is president and W. B. Schiller is secretary and treasurer. The main office is at Youngstown, Ohio, and the quarries are located in North Beaver township, Lawrence County, Pa. The land under lease comprises 1500 acres. The limestone is strictly of Bessemer quality. A railroad 5 1/2 miles long is being built to connect with the Pennsylvania Company's system at Covert's Mills. The cars will run

into the quarries by sidings, thus doing away with inclines. The capacity of these quarries will be 2000 tons a day.

The corn-planter and check-rower manufacturers of the West held a meeting in Peoria, Ill., on the 25th ult., and organized the Corn-planter and Check-rower Manufacturers' Association, and elected Alexander Herst, of Peoria, president; C. B. Keller, of Peoria, secretary, and W. B. Chambers, of Decatur, treasurer. These officers also comprise the Executive Committee. Out of 27 Western factories 18 were represented, and the absent concerns sent in pledges to stand by the action of the meeting. A minimum price was agreed upon and a scale of discounts. It is stated that competition had advanced to such a ruinous point that this step was necessary in order to secure a profitable return from business.

San Francisco trade with the Orient has suffered this year because of the rise in wheat and the consequent suspension of flour mills. The total value of the shipments of merchandise to China for the year up to August was \$1,600,000, while the value of the shipments to Japan was \$160,000. The treasure shipment to China this year amounts to \$6,000,000. Of the China shipments \$2,700,000 was in Mexican dollars.



## Special Notices.

## BUSINESS OPPORTUNITIES.

## AN OPPORTUNITY FOR MANUFACTURERS.

The very best advantages for new manufacturing enterprises in the South are offered by the

## GATE CITY LAND COMPANY,

Birmingham, Alabama. The Company's property lies just out of the city of Birmingham, and is traversed by four of the trunk railroads running into the city. It possesses the general advantages of the Birmingham district, including a fine deposit of red hematite iron ore and large quantities of lime rock and building stone. One of its notable peculiar advantages is a pure white glass sand, pronounced by a Northern authority the finest of the kind in the country; while a variety of other sands of lower grade are found on the lands. The latter also have exceptional advantages for a paint mill. The recent large investment of Northern capital in Birmingham furnace property may be taken as conclusive testimony to the splendid advantages of the place for making pig iron. It has twenty furnaces in operation or building; also, in operation, a large rolling mill, stove works, cast-iron works, foundries and machine shops and a variety of other iron working enterprises. There are now located on the Gate City property a rolling mill, iron safe works, a pottery and several smaller enterprises. The company is now ready to co-operate with other manufacturers who may wish to locate in the South, and share in its new prosperity. Every enterprise about Birmingham has all the business it can do. There is room for new comers in all lines, and the undersigned has eligible manufacturing and residence sites to offer to a. c.

ROBT. WARNOCK, Pres. Gate City Land Co.

## FOR SALE.

A plant suitable for the manufacture of Agricultural Machinery, consisting of two large, commodious buildings—one for iron and wood-working machinery, the other for finishing, painting and also, on same ground and in connection with it, a large foundry and smith shop. The whole is stocked with a full supply of the best makes of iron and wood-working machinery, necessary small tools, with complete sets of patterns for manufacturing Reapers, Mowers and Self Binding Harvesters, all of which are in excellent condition and practically as good as new. It is desirable to sell the above as a plant, and an excellent opportunity is here offered to any one wishing to engage in manufacturing. Should parties desire to purchase machinery alone, would sell the same separately. For further particulars address

DORSY MACHINE COMPANY,  
MILTON, WAYNE COUNTY, IND.ATTENTION,  
Capitalist - and - Foundryman.

An Incorporated Company offers for sale State Rights to manufacture, and sell a valuable Patent Boiler (for house-heating). Hundreds in successful operation, which can be referred to for full particulars.

Address Box 1006,

WORCESTER, MASS.

New England States reserved.

## VALUABLE IRON MINE FOR SALE.

This property covers an area of 3.0 acres and exhibits at various points an Ore giving 60 per cent. of Iron—furnace best—no sulphur or phosphorus. The property is situated within 10 miles of Ottawa and is most favorably placed for mining operations. The highest reports upon the property have been received from first-class experts. Title perfect. The new Canadian Iron tariff makes this a most valuable property. Samples of the Ore and further particulars can be obtained by applying to the Manager—Ontario Bank Ottawa, Canada.

## FOR SALE AT A BARGAIN.

A clean and complete stock of

## HARDWARE

In Northern Michigan. About \$12,000. Address

"HARDWARE STOCK,"

Office of The Iron Age, 66 and 68 Duane Street, N. Y.

## FOR SALE.

AT GREENWOOD, OHIO, on C. & A. R. R., in one of the best farming cities Northwest, O., a General Hardware and Grocery Store, with entire stock of goods; a fine residence with good dwelling house and ornamental trees; fine fruit; fine well of water and clear; 2 acre lot; good stable and outbuilding; a good place to live and good trade; all clear of debts; but bargain offered; will double in 10 years; worth good to a live business man. J. C. ROBINSON, Wren P. O., Ohio.

## FOR SALE.

## A GOOD CLEAN HARDWARE STOCK.

In a town of four thousand inhabitants in Southern Dakota; annual sales, \$25,000. This is a rare chance and will bear investigation. Cause of selling, death in family. Adress

"LOCK BOX 173,"

Mitchell, Dak.

## FOR SALE.

\$10,000 half interest in an established

## HARDWARE, MACHINERY AND TOOL BUSINESS.

In New York City, to extend the business. To satisfy intending investors, and also convince the merchant of the investor's knowledge of the business he proposes that he come as Salesman for six months. Address "BUSINESS," office of The Iron Age, 66 and 68 Duane St., New York.

## CHARCOAL IRON FURNACE

Parties now owning a Charcoal Furnace in successful operation and producing a high grade car wheel iron of established reputation will sell one half interest for purpose of enlarging the works and increasing production. Address "CHARCOAL IRON," office of The Iron Age, 66 and 68 Duane St., N. Y.

## HELP WANTED.

An extensive and established house dealing in iron heavy hardware and carriage goods in a city of 20,000 inhabitants, seeks the services and capital of a thoroughly posted party to take entire management of their woodwork department; liberal salary and profits on investment guaranteed. Full particulars on addressing "WOODWORK," office of The Iron Age, 66 and 68 Duane St., N. Y.

## FOR SALE.

A MANUFACTURING ESTABLISHMENT, nearly new, at Guilford, Conn., on the New London Division, N. Y. & P. & H. R. R., consisting of a two-story brick building, 30 x 70 ft.; a two-story brick addition, 22 x 35 ft.; a one-story addition, 12 x 22 ft.; a boiler room, coal shed and store house. A full complement of the most improved machinery for manufacturing Vegetable Ivory Buttons. Forty horse-power Engine and 50 horse-power boiler. Everything in running order. Convenient to railroad and particulars apply to E. H. BUTLER, Receiver, Guilford, Conn.

## Special Notices.

## BUSINESS OPPORTUNITIES.

## FOR SALE.

## THE MELVIN SEWING MACHINE CO.'S FACTORY AND GROUNDS.

located in Chillicothe, Ross Co., Ohio, and adjoining the depot grounds of the C. W. & B. and Scioto Valley Railroads. The main building is of brick, 133 x 33 feet; three stories, slate roof, well-lighted and floors 6 in. thick. The Engine, Boiler and Japan rooms and Blacksmith shop are all of brick and covered with tin. The whole building heated by steam and lighted by electricity. It contains a 45 horse-power Reynolds-Corliss Engine, a 75 horse-power Babcock & Wilcox Boiler and Edison Dynamo, all in good condition. One house and lot and three vacant lots, all adjoining the factory grounds. This is a desirable property for manufacturing purposes, and will be sold at a bargain. For further particulars call on or address

NELSON PURDUM, Receiver,

Chillicothe, Ohio.

## IMPORTANT TO CAPITALISTS.

## FOR SALE.

## THE JOSEPH HALL MACHINE WORKS.

Oshawa, Canada, covering 140,000 superficial feet, with main buildings, brick, 2 1/2 and 3-stories high, substantially built, and all the machinery, tools, dies, patterns and plant therein that originally cost over \$200,000. Also for Sale, Trashing Machines, Oshawa Mowers, Portable Engines, Horse Powers, Waterwheels, Machines in process of manufacture, parts of machines for repairs and unsold stock, the whole valued at over \$50,000. The works are admirably equipped for doing a large agricultural implements, general machinery or car works business. I will sell the whole en bloc at a low price or in parts to suit purchasers, on liberal terms of payment.

JOHN LIVINGSTONE,

Trustee.

## FOR SALE.

A complete Plant for the Manufacture of Axes and Edge Tools. Business established over fifty years ago, and now in flourishing condition. Commodious buildings in thorough repair, and abundant room to enlarge if desired. Water power for eight months of the year and 120 h.p. engines for the balance of the year, operated by natural gas at a cost of 30 per cent. less than other fuel. Fully equipped with first-class machinery, including Washoe Pick Machine, Axe Rolls, 8 and 10 inch Tool Hammers, Friction Wheels, and all other machinery, tools and appliances necessary for turning out a full line of axes and edge tools. Railroad siding for receiving and shipping freight. Situated at Jamestown, N. Y., on line of Erie and B. and S. W. R. R. For further particulars, address HENRY SMITH, Jamestown, N. Y.

## WANTED BY A HARDWARE FIRM

with a number of Salesmen constantly on the road, the exclusive agency for the West and Southwest of Table and Pocket Cutlery Razors and other Specialties; have excellent facilities to handle goods to advantage; best of references.

Address "HARDWARE,"

Box 784, St. Louis, Mo.

FOR SALE—Water-power and Land, ten acres if necessary, located in a beautiful town on the line of the N. Y. C. and H. R. R. R., with advantages of pleasant homes, good schools, cheap and intelligent labor, etc. A manufacturer employing steadily 300 to 500 men can probably get a liberal bonus from the town. For particulars address

"WATER-POWER,"

Office of The Iron Age, 66 and 68 Duane St., New York.

## NOTICE

## TO HARDWARE MANUFACTURERS

If you have any desirable specialties for which you would like to establish an agency in Philadelphia, please address

J. B. CARTER,

Hardware Manufacturers' Agent,

304 Commerce Street, Philadelphia, Pa.

## FOR SALE.

## HARDWARE STORE, FURNACE AND PLUMBING BUSINESS.

with a profitable trade; about \$10,000 capital required; business long established; satisfactory reasons for selling. Address "S.N.A.P." office of The Iron Age, 66 and 68 Duane St., New York.

## AGENTS WANTED TO SELL SPECIALTIES

## IN

## MUNICIPAL SUPPLIES:

Street Names, House Numbers, Park Notices, &c. on Enamelled Iron. Illustrated catalogue.

F. E. MARSLAND,

84 West Broadway, New York.

## FOR SALE.

CUT NAIL FACTORY, with all the necessary appliances for economy in manufacturing Cut Nails; factory contains 36 machines, making from 3d. fine to 8 in. spikes, and run by 12 x 45 in. engine; will sell machines separate.

Apply to A. R. WHITNEY & CO.,

17 Broadway, New York.

## A SPECTACULAR OPPORTUNITY FOR FOUNDRYMEN AND MACHINISTS TO DO A LARGE AND PROFITABLE BUSINESS AT AN EXTENSIVE AND OLD ESTABLISHED PLANT;

the engine works, &c., formerly so well known as the Woodbury & Beach Iron Works, located at Hartford, Conn., and covering about five acres, are now offered for sale or rent, as a whole or in part. The daily use of the valuable patterns belonging to these works would be in itself a source of large yearly income. For full particulars and for circulars describing the property, apply to

H. B. BEACH & SON, Agents,

Hartford, Conn.

## FOR SALE—Stock of HARDWARE, STOVES AND IMPLEMENTS, in one of the best business towns in Western Indiana; the stock will involve \$15,000 and store is doing a business of \$75,000 to \$100,000 a year; the only reason for offering the business for sale is on account of the poor health of the proprietor; a favorable lease of rooms and warehouses will be given.

Address JOHN G. BRYSON,

Brazil, Ind.

## CUTLERY AND GUN BUSINESS

## FOR SALE.

In a large Western city, long established, in full operation, with good live trade; satisfactory reasons for selling. To any one having some capital and wanting to step into a good, going business, this is a rare opportunity. For particulars, address "SHARPE," Box 109, office of The Iron Age, 66 and 68 Duane St., N. Y.

## WANTED TO SELL, the leading HARDWARE BUSINESS OF DENVER, Col., located in the heart of the city; good fixtures and one of the best-equipped stocks in Colorado. For further particulars, address No. 2086 Jay St., Denver, Col.

## Special Notices.

## BUSINESS OPPORTUNITIES.

## WANTED,

## TO CORRESPOND WITH MANUFACTURERS

of some Hardware or Lumber's Specialties, who do not keep out agents, with the view of selling same in connection with our own goods.

THE GOULDS MFG. CO.,

Seneca Falls, N. Y.

I DESIRE New York Agency for one or more Hardware specialties, or would buy for one or more houses; have been in Chambers street ten years and am well known; A. references furnished.

Address E. B. THOMAS,

95 Chambers Street, New York.

## FOR SALE.

This is a splendid chance for anybody to buy a first-class STOCK OF HARDWARE, located in a thriving town in Western New York; retail sales \$50,000; business first-class; good reason for selling. Address "O. P.," office of The Iron Age, 66 and 68 Duane St., New York.

## HELP WANTED.

Undisplayed Advertisements for Help Wanted not exceeding fifty words One Dollar each insertion. Additional words two cents each.

## TRAVELING SALESMEN WANTED—COM.

PATENT, KNEGTIC AND PUSHING SALESMEN to sell a line of special goods well known to the Hardware, Stove and House-Furnishing Trade; must be familiar with the Hardware Business, and experienced in selling goods on the road, and furnish first-class references. Other lines not conflicting can be taken. Liberal commission. Address "Box 141," Manchester, N. H.

## A FIRST-CLASS SUPERINTENDENT FOR A MERCHANT BAKERY.

A MERCHANT BAKERY, native American; well up, with best of references. Address immediately, KNOXVILLE IRON CO., Knoxville, Tenn.

## WANTED TO CORRESPOND WITH A MAN

who has a full knowledge of the Crucible Steel Casting Business, with a view to engage such a man. Address "CRUCIBLE STEEL CASTING," 117 South Street, St. Louis, Mo.

## TRAVELER TO SELL TABLE AND POCKET CUTLERY

to the retail trade in the Eastern States on commission; also one each for New York State, Pennsylvania, Ohio, Indiana and Michigan; only those need answer who have an established trade and who wish to add above goods to their line. Address "CUTLERY," Box 273, Office of The Iron Age, 66 and 68 Duane St., New York.

## SITUATIONS WANTED.

Undisplayed Advertisements for Situations Wanted not exceeding fifty words Fifty Cents each insertion. Additional words one cent each.

## A YOUNG MAN, experienced in the chemical

and office work and management of furnaces, desires position as FOUNDER OR ASSISTANT SUPERINTENDENT. Reference from present and past employers. Address "C & O. W.," Office of The Iron Age, 66 and 68 Duane St., New York.

## BY A YOUNG MAN of a few years' experience,

a position as Hardware Clerk; understanding the business in all its branches; quick, reliable and a first-class salesman; satisfactory references can be given; ready to commence at once; moderate salary expected. Address "Edw. R.," 117 Pleasant street, Northampton, Mass.

## BY A GENTLEMAN OF MIDDLE AGE,

of good business abilities and extensive experience in the management of Hardware, Glass, Paints, Carriage Stock and Lumber Mill Supplies; no objection to going South; best of references given and required. Address "ROZ," Office of The Iron Age, 66 and 68 Duane Street, N. Y.

## A MAN with 15 years' experience in the Clock

Business wishes a position of trust, as Superintendent or Manager with some good reliable manufacturer in the West. Understands all kinds of the press and machine work, all kinds of novelty and brasswork, gold, silver and nickel plating; and can give the best of reference from present place, where I have been foreman and superintendent for a number of years. Address NELSON BAYLER, 20 Clark St., New Haven, Conn.

## A YOUNG MAN with five years' experience in

the hardware trade, wishes a position as SALESMAN OR ORDER CLERK; best of references. Address "P. L.," Office of The Iron Age, 66 and 68 Duane Street, New York.

## BY AN OFFICE MANAGER, thoroughly ac-

quainted with book-keeping, Correspondence, Banking, &c., a position, with Manufacturing Mercantile or Financial Concern. Address "C. S. P.," care of Letter Carrier 301, Station G, Philadelphia, Pa.

## A POSITION, on or before Jan. 1, as SUPER-

TENDENT OF HARDWARE MANUFACTORY; thoroughly understands every branch; good references. Address "Craig," office of The Iron Age, 66 and 68 Duane St., N. Y.

## AS FOREMAN, in an IRON FOUNDRY by one

who has had 20 years' experience as such; is a practical foundryman, and thoroughly competent to take full charge on large or small work; has been very successful in handling men; desires a change of locality and would like to correspond with parties in need of a Foreman. "A. 1," office of The Iron Age, 66 and 68 Duane St., New York.

## A MANAGER OR FOREMAN for an open

hearth steel plant by a practical Melter and Chemist. Experienced in soft steel castings and all other work. Address "A. S.," office of The Iron Age, 77 1/2 Duane St., Pittsburgh, Pa.

## MECHANICAL ENGINEER AND DRAUGHTSMAN,

MAN, with theoretical knowledge and extensive practical experience in Designing, Estimating and Constructing in connection with a wide variety of engine and boiler work; millwork and machinery, hydraulic work, structural work, etc., also, the planning and building of mill factories, &c., desires an engagement. Address "D. E. C.," P. O. Box 568, Chicago, Ill.

## CIVIL AND MECHANICAL ENGINEER, with

good English qualifications, wants employment. Thoroughly practical. Address "ENGINEER," P. O. Box 372, Brantford, Ontario.

## BY A FOUNDRY FOREMAN, at present en-

gaged in a large iron foundry running both heavy and light work; is familiar with loam, dry and green sand work; well posted in mixing charcoal, coke and anthracite irons, in melting with coal or coke; can give good results with either; used to handling men. Address "Box 222," office of The Iron Age, 66 and 68 Duane Street, N. Y.

## MECHANICAL DRAUGHTSMAN, graduate

M. E., with first-class references, wishes a position; able to take charge of drawing office and act as Assistant Superintendent; can offer knowledge against capital; the three languages fluently; 14 years' American and European experience. "E. S.," 24, Office of The Iron Age, 66 and 68 Duane St., New York.

## A GENTLEMAN who has had an extensive

business experience and who possesses business abilities of a high order, would like to make an arrangement to take charge of a Chicago Agency for some first-class Eastern manufacturer of iron and steel goods, both East and West. Address "H.," Office of The Iron Age, 66 and 68 Duane Street, New York.

## EUGENE BISSELL, Auctioneer.

## HAYDOCK &amp; BISSELL,

Successors to

ROBERT R. HAYDOCK & CO. and E. BISSELL & CO.

WHOLESALE

## HARDWARE AUCTIONEERS.

12 Murray St. and 15 Park Place, N. Y.

Sales held weekly for the trade. Consignments solicited. We refer to the leading manufacturers and importers.

## Special Notices.

## MISCELLANEOUS.

## Proposals for Steel-cast Guns for the Navy.

NAVY DEPARTMENT,

WASHINGTON, D. C. June 23, 1887.

Under authority conferred by the act of Congress, approved March 3, 1887, making an appropriation "for the purchase and completion of three steel-cast, rough-bored and turned, six inch, high-power rifle cannon, of domestic manufacture, one of which shall be of Bessemer steel, one of open-hearth steel, and one of crucible steel," sealed proposals from domestic manufacturers, to furnish the same, will be received at this Department until Tuesday, the second day of August, 1887, at 12 o'clock noon, at which time the proposals will be opened.

Proposals may be made either to furnish three completely finished six-inch, breech-loading, high-power rifle cannon, made from unforged castings, one of Bessemer steel, one of open-hearth steel, and one of crucible steel, or three unforged, rough-bored and turned castings for such cannon, of the same material, respectively, to be finished by the Department in accordance with the bidder's design.

No gun or casting for a gun will be paid for until the gun shall have been completed and have successfully stood the statutory test, required by the act of July twenty-sixth, eighteen hundred and eighty-six, entitled "an act making appropriations for the naval service for the fiscal year, ending June thirtieth, eighteen hundred and eighty-seven, and for other purposes." [For statement of requirements of said test, and of other conditions to be observed, reference is made to "specifications" which can be had upon application to the Department.]

Proposals may be made for one or more guns, or for one or more castings as aforesaid, but must be made separately for each gun or casting for a gun and upon forms prepared by the Department.

Each successful bidder will be required to execute, within fifteen days after notice of award, a formal contract in accordance with his proposal, and to furnish a bond, with satisfactory sureties, in a penal sum equal to fifteen per cent. of the amount of his bid, conditioned for the faithful performance of such contract.

Copies of the specifications, with blank forms of proposals, and all additional information desired, can be obtained on application to the Bureau of Ordnance, Navy Department.

All proposals must be in duplicate, enclosed in envelopes marked "Proposals for Steel-cast Cannon," and addressed to the Secretary of the Navy, Navy Department, Washington, D. C.

The right is reserved to waive defects in form and to reject any or all bids.

WILLIAM C. WHITNEY,

Secretary of the Navy.

## NAVY DEPARTMENT.

WASHINGTON, D. C., June 20, 1887.

In order to give more time to domestic manufacturers to consider the matter, the period limited for the reception of proposals for steel-cast guns is hereby extended, and such proposals will be received, under the foregoing advertisement, as modified, until Tuesday, the twentieth day of September, 1887, at 12 o'clock noon, at which time the proposals will be opened.

WILLIAM C. WHITNEY,

Secretary of the Navy.

## TO BRIDGE BUILDERS.

Sealed proposals will be received by the Committee of the Board of Chosen Freeholders of Hunterdon County, at the Court House in Flemington, N. J., until 2 o'clock p. m. on Wednesday, the seventh day of September, 1887, for the ERECTION OF A WROUGHT-IRON BRIDGE over the south branch of the Raritan, at Califon, N. J.

The Bridge to be built in one span of ninety-five feet in the clear between the faces of the masonry, with one roadway of eighteen feet wide in the clear. The capacity of the Bridge to be 400 pounds per lineal foot, exclusive of its own weight. The maximum strains due to specified load and bridge weight shall not strain the iron in tension more than 12,500 pounds per square inch in Gordon's formula for compression on upper chord and strain sheets, showing the maximum strains under the specified loads, and the sizes and cross sections of each principal part. All iron work to receive one good coat of mineral paint, well rubbed in at the shop, and two coats of light-colored paint after erection. Bids to be made in a lump sum covering the whole work complete as above specified. All work to be done in a good and workmanlike manner.

The Bridge to be completed on or before November 15, A. D., 1887. The Committee reserve the right to reject any or all bids.

CHAS. S. WOOLVERTON, CHRISTOPHER SMITH, G. L. EMERY, JAMES W. JOHNSON, FRED'K U. PHILIPPOW, JOHN A. SMITH.

Dated Aug. 18, '87. Committee.

## FOR SALE.

Ten (10) No. 2 Siemens' Regenerative Gas Lamps,

with Factory Fixtures and Reflectors complete

and in order; only used three or four months

will be sold cheap.

DANVILLE NAIL & MFG. CO.,

Danville, Pa.

## MANUFACTURERS, ATTENTION.

An enterprising manufacturing concern, located at Detroit, Mich., in line search of Patent Specialties, Household Articles, &c., to enlarge business. Articles composed of tin, wire and sheet iron preferred. Ample capital and facilities at command. Must control manufacture and sale of goods throughout the West, including Pacific Slope. Patentes, manufacturers and dealers are invited to correspond. "BOX 73," Detroit, Mich.

## WM. H. ROBINSON,

## CONTRACTING AND CONSULTING

## MECHANICAL ENGINEER.

I am prepared to furnish complete working drawings of the CORLISS ENGINE, Plate specifications and estimates for Rolling Mills, Tube Mills and Furnaces and to superintend their construction. All modern improvements.



### Special Notices

## MISCELLANEOUS

Aluminium, "the Metal of the Future."  
The Only Treatise in the English

**Language.**

Aluminum: Its History, Occurrence, Properties, Metallurgy and Applications, including its Alloy. By Joseph W. Richards. A. C. Chemist and Practical Metallurgist, Member of the Deutsche Chemische Gesellschaft. Illustrated by 10 engravings. 12 mo., 510 pages. Price, \$2.50, free of postage to any address in the World.

**Contents:** Part I. History of Aluminum. II. Occurrence of Aluminum in Nature. III. Physical Properties of Aluminum. IV. Chemical Properties of Aluminum. V. Metallurgy of Aluminum. VI. The Manufacture of Sodium. VII. Manufacture of Aluminum. VIII. Manufacture of Double Chloride of Aluminum and Sodium. IX. Manufacture of Aluminum at Saltdred (dard). X. Reduction of Aluminum by other Reducing Agents than Sodium. XI. Working of Aluminum. XII. Alloy of Aluminum. Appendix. Addenda. Index.

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## THE WEEK.

Land speculation is rife in California from the crest of the Sierra Nevada to the sea. At Los Angeles, 17 miles inland, half a dozen cities are springing up—on paper—and town lots are selling for as much as 1 acre would have brought six months ago. At San Diego, 12 miles from the boundary of Mexico, a Connecticut man who purchased a tract 19 years ago for \$260 has sold over \$2,000,000 worth of real estate from his original purchase, and retains improved property valued at \$1,000,000. At Coronado Beach, in full view of San Diego, sales to the extent of \$1,500,000 within the last six months from a tract which two years ago could have been bought for a few hundred. "But perhaps the most remarkable of these land enterprises," says a San Diego correspondent, "is that now in progress by what is known as the International Company of Mexico. The latter are mainly composed of New England, Chicago and English capitalists, who have secured from the Mexican Government nearly all of its unsold lands, amounting in the aggregate to over 80,000,000 acres, and receiving therewith concessions of untold value, such as subsidies for railroad and steamship lines, exempting from duties all raw materials for manufacturing purposes and supplies for colonists, and the privilege of free exports to all the States of Mexico. The lands thus acquired by the International Company cover the whole of the territory of Lower California, from the Pacific Ocean to the Gulf, and from the northern boundary of Mexico down the coast a distance of 300 miles, besides immense tracts in other Mexican States. The nucleus of the company's operations is already well under way at Todos Santos Bay, 105 miles south of this port by land and 70 miles by sea."

The announcement is made definitely by a Chicago paper that a contract has been closed with the Globe Iron Works, of Cleveland, for a fleet of steel steamships for the St. Paul, Minneapolis and Manitoba Railroad Company. The contract calls for six boats, each to cost \$220,000. They are to be built after one model, 310 feet over all, 296 feet keel, 40 feet beam and 24 feet molded depth, with triple expansion engines, diameter of cylinders 24, 38 and 60 inches, by 42 inches stroke. Steam will be furnished by two boilers, each containing three furnaces and with a working pressure of 150 pounds. The boats will form a line between Duluth and Buffalo.

The Chilean Congress has passed a law granting a subvention to the Chilean Steamship Company, and exempting from the payment of import duties articles introduced for mining and other industrial purposes.

It is claimed that provisions are now being shipped from Chicago for delivery at Liverpool at a less rate than is charged from Chicago to New York. An official investigation of the trouble by the Interstate Commission has been suggested.

W. C. Wyckoff, secretary of the Silk Association of America, reviews the history of American silk manufacture, an industry which has risen to a product of \$60,000,000 on a capital of \$30,000,000, employing 50,000 hands. Since the imposition of a duty amounting to from 50 to 60 per cent., the growth of the industry has been steady, and, save in the depression of 1877, uninterrupted. Since 1879 the product has nearly quadrupled, and the imports of raw silk—perhaps a still better proof of the advance of this great manufacture—have advanced in value from \$3,854,008 to \$20,789,261 for the last fiscal year.

A bulletin just issued by A. Blue, secretary of the Ontario Bureau of Industries, shows that the crops of Ontario are this year, as a general rule, much below the general average of the preceding five years. The total yield of fall wheat is 14,135,595 bushels, the average yield per acre being 16.2 against an average for the preceding five years of 20,635,843, and an average yield per acre of 21 bushels. Spring wheat shows a falling off of over 4,500,000 bushels, or upward of 40 per cent., the yield being 6,030,440 bushels, an average 12.4 bushels per acre. Barley fell off from an average of 19,572,730 bushels to 17,436,322, and oats from an average of 55,333,393 to 50,604,590. The figures of crops, with the averages, notwithstanding the bad season, show that the agriculturists of Ontario are excellent farmers, and that their farms are not only well tilled, but well provided with stock.

A thorough inquiry into the workings of the immigration system at Castle Garden and at the institutions where foreign paupers are maintained at public expense is called for. The revelations already made show that gross abuses are tolerated in various forms. At Castle Garden there are too many vultures and cormorants fattening on emigrants landing there in connection with the handling of baggage, purchase of railway tickets, &c. One statement made is that at Ward's Island of 1900 inmates of the asylum two-thirds are of foreign birth, and that in another institutions there are 1200 insane foreign paupers, the refuse of Europe, most of whom should have been returned to the countries from whence they came. A rigid enforcement of the federal laws concerning immigration would silence much of the clamor now directed against our immigration system. Laws which permit the landing of paupers, criminals and insane

persons, but exclude workmen skilled in the industries of Europe, show that a screw is loose somewhere.

New Orleans complains of changes in the current of trade to the detriment of that city. While the city has lost a considerable portion of the territory formerly tributary to it, while its influence is no longer supreme in Texas and Arkansas as of old, it is becoming each year the port and shipping point for a larger territory, but the bulk of this trade passes through without any local advantage. For example, heavy California freights pass through from the Southern Pacific Railroad, bound to New York and a large portion of the Texas wool crop and enormous quantities of hides, besides an increasing business from Mexico and Central America. The New Orleans *Times-Democrat* asks, "Why should these hides go North to New York, be thence distributed and tanned, sent afterward to the New England towns, made there into boots and shoes, and then shipped back to us? It is as bad, indeed worse, than sending the cotton to England, and buying back the goods produced, for the boots and shoes are more easily made and do not require all the machinery and skill needed in the finer class of cotton goods."

Mica mines on the Lierre, not far from Montreal, Ontario, are being worked with good success with the aid of drills and compressed air. The average output of mica is from 500 pounds to 600 pounds for 24 hours, of which about one-third is available for the splitting house, where it is split, then sent to the village to be cut into merchantable shape, and again reduced in the process by about two-thirds. Large quantities of refuse mica are stored up sometimes to be ground. When ground, this mica is used greatly by engineers and others as a lubricant, oil. It is also used largely for decorative purposes, and in the preparation of fire-proof paints.

Of the overwhelming effects of German competition, our Consul at Zurich writes to the State Department as follows: "Taking a general survey of the commercial and industrial situation in this section of Switzerland, we find everywhere present and dominant the determined pressure of German enterprise and competition flooding the land with all classes of her manufactures and products, and in most cases at the ruinous prices which inevitably follow overproduction." As a measure of self-protection the Government is said to have resolved to impose a heavy duty on German imports.

The new Brazilian tariff now in force is designed to favor native industries by reducing the charges on imported raw materials, but discriminating in favor of such articles as are produced within the empire. The reduction affects copper in bars and sheet iron to some extent.

The British Government has notified the Department of State that the date for receiving applications for space at the Melbourne International Exhibition has been extended from the 31st of August to the 31st of October, 1887.

Speculation in the Argentine Republic, already at a high pitch, is expected to receive a still further impetus from the success of a German loan of 10,291,000 pesos. Improvements of all sorts will be prosecuted with renewed vigor, but London and Paris financiers are distrustful of the final issue.

In speaking of the craft that ply the Great Lakes, and of their appearance from almost any point on the Saint Clair or Detroit River, a writer in the *Monetary Times* says that "figures of tonnage, numbers of boats and of trips, are not one-tenth so impressive as the sight of these propellers, side wheelers, barges, sail craft, laden with flour, grain, pork, lumber, ore, downward bound, or with coal, rails, merchandise, upward bound, passing at all hours of the day and night. But a significant fact as to their number is found in the figures laid before Congress on the authority of the United States Marine Engineers. By actual observation and count the vessels, steam and sail, which passed Bois Blanc Island, averaged during the season of 1886 one every seven and a half minutes, and during one month of the navigable season, one vessel every five minutes night and day. This means 40,000 floating carriers in a season of seven months. How many millions of money those argosies represent we should scarcely venture to say. The figure would run into the hundred millions."

Iron will enter largely as a material in the construction of improved coast defenses in Japan. The plan most favored is a system of earthworks protected by an iron shield 1 foot in thickness, extending 25 feet on each side of the gun.

The Merritt Wrecking Company receive \$32,500 for raising the steamer Wells City, which will be sold at auction.

The Government of Guatemala offers special facilities to vessels trading on the coast of that republic, and in furtherance of this object have published a decree taking effect September 1, allowing a drawback of 3 per cent. on all merchandise imported direct at ports on the Pacific. Merchandise, however, imported by steamers of lines already established, or which subsequently may be established between San Francisco, California and Panama, shall only be allowed a reduction of two and nine-tenths on

such important dues. In order that merchandise shall enjoy these privileges, it is necessary that the representatives of the steamship lines shall present schedules of their itineraries and their tariffs of freights and passages, and details of all other conditions and guarantee the regularity of their voyages.

The gold which is now being dug out of the ancient cemeteries in Cauca has led more than 1000 workmen to flock to that spot, and a town has sprung up there within the past four years which now contains more than 50,000 inhabitants. *Las Noticias*, of Bogota, invites attention to the ancient burial places of the wealthy Cacique Caracal as an inviting field of enterprise, as it is reasonable to believe that treasures remain "immensely more valuable than any which have been unearthed." The local inhabitants are almost all Antioquians, and the majority of them have obtained sufficient to render themselves independent of work for the remainder of their lives.

Several of the great railroad corporations are contemplating the establishment of lines of ocean steamers, either by building or charter. C. P. Huntington is quoted as saying he intends "to build new steamships and sail them from Newport News in connection with the Chesapeake and Ohio." The Reading Company have constructed the largest bonded warehouse in the city at Port Richmond and are said to have arranged for a line of steamers to operate in connection therewith. The Baltimore and Ohio Railroad Company have nearly completed their bonded warehouse on the Delaware River, in prosecution of a similar design.

General Guzman Blanco is no longer president of Venezuela, having resigned to become minister plenipotentiary abroad, and is succeeded by General Hermogenes Lopez, who accumulated his fortune by attention to agriculture and commerce.

Judge Potter of the Supreme Court granted a stay of execution of the judgment convicting Jacob Sharp of bribery. He says Judge Barrett erred in permitting Sharp's testimony before the Senate Committee to be used against him on his trial.

A Waterbury merchant dined at the expense of two "bunko steers" in this city, who were left at the table somewhat hastily, with an invitation to come to Waterbury, which was "a good place to work."

A Birmingham firm are making an oar in which the blade is made from the best sheet steel, highly tempered. It is put forward as being much stronger than the ordinary wooden one, and cannot be broken without undue violence. The handle fits into a socket running nearly the whole length of the blade, and forming a backbone of great strength. The oar, being much thinner in the blade than the wooden ones, enters and leaves the water cleaner. The handles are made separately, of ordinary spruce or ash, and, if broken, can be readily replaced.

Asphalt pavements are being introduced with good success near the great office buildings down town, to cut off the rumbling sound made by vehicles in the street.

Of the 600 workmen lately in the employ of Mitchell, Vance & Co., 500 have been discharged, including the workers in artistic brass, for which the house has been noted. The financial entanglement does not improve, on examination.

One of the latest improvements in the big office buildings on Broad street has been introduced into the Mills building, in New York. It is a patent mailing tube, by which letters may be posted in a drop on any story, from which they are shot into a large mail box on the ground floor, which is visited by the collector on every tour.

Senator Cullom, whose hand was conspicuous in framing the Interstate Commerce law, expresses himself satisfied with its practical workings, except as to some of the less important details, and he expects that when the commission reports to Congress certain amendments will be suggested to remedy defects. "Where the bill hurts," he says, "it is objectionable, but on the other hand there are thousands who are benefited. Interstate legislation has come to stay."

Akron cement is manufactured from limestone rock at Akron, in Erie county, N. Y., where there are three great works, turning out about 3500 barrels of water lime per day and giving employment to 300 laborers. Several tunnels penetrate the sides of the hill, from whence drifts lead in various directions. The drilling is all done by machinery. The strata of cement rock average between 7 and 8 feet in height and cover hundreds of acres in area.

A conference on the sugar question has been called by the Government of Great Britain, at which several European countries will be represented, the object being to secure the abolition of bounties and drawbacks on the export of sugar.

The project which C. P. Huntington, of the Central Pacific and Newport News and Mississippi Valley Railway, has in view of building an interoceanic railway across Central America is receiving more attention since his recent return from Europe. The object is to furnish an outlet for the products of the Mississippi valley and especially for those of the coal and iron mines, furnaces and foundries of Alabama. The distance

from New Orleans and Mobile to Honduras Bay is not much greater than to the Gulf terminus of the proposed Tehuantepec railway, and there are said to be advantages in tides and wind currents favorable to the Honduras route. This line, it is said, will be in operation before work on the Tehuantepec route is begun. Coal from Birmingham can be delivered on barges at the Bay of Honduras at from \$2.50 to \$3 a ton, about equal to the cost at Newcastle, England, of delivering it on shipboard.

The breakwater at Cleveland harbor, on Lake Erie, will cost, when finished, \$1,300,000. The harbor of refuge, when completed as now planned, will be about 2 miles long, and offers an area of 300 acres for anchorage, the depth of which in 200 acres will be from 17 to 29 feet.

Poor's Manual for 1887, just issued, shows that during 1886 over 9000 miles were added to the railroad system of the United States, an increase which has been exceeded only once or twice in any one year. In addition to those 9000 miles, there have since been built, according to close estimates, about 5500, making in all some 14,500 miles constructed within 20 months. Accepting \$20,000 per mile—a fair average—as the cost of these new roads, it appears that the total investment has been the enormous sum of \$290,000,000.

A Poughkeepsie journal seeks to allay the fears of those who believe that the bridge at that point will seriously obstruct the navigation of the Hudson River. Although the channel has been temporarily narrowed 1000 feet by trestlework and other impediment to navigation, and to an extent far greater than it will be in the future, the commerce of the river this season has increased, the canals have had the best season for many years, more merchandise from the West has been carried down the Hudson than ever, the great tows of canal boats are the largest known, the rates of insurance are lower than usual, and the cost of tonnage is not greater than last year, nor has there been any accident or delay as a consequence of the alleged obstruction.

A fire in Detroit on Monday destroyed the cooperative establishment owned by Havemeyer & Co., sugar refiners, of Brooklyn, N. Y., and which gave employment to 400 men. The works covered 20 acres. Estimated loss, \$300,000.

The Panhandle bridge across the Ohio, below Pittsburgh, at Brunot's Island, will be all of iron, and cost not far from \$1,500,000. The plans will be offered for the approval of the Secretary of War, in case the scheme already submitted for his sanction should be rejected.

On the Indiana side of the Ohio River, 25 miles from Louisville, the Union Gas Company, of that city, have just struck natural gas at a depth of 400 feet, with a flow estimated at 10,000,000 cubic feet per day. The only well said to exceed this in flow is the Harg well, at Findlay, Ohio, the flow of which is reported to be 12,000,000 cubic feet in 24 hours.

The Land Commissioner has issued the necessary instructions for the carrying into effect of Secretary Lamar's recent order restoring to settlement certain railroad indemnity lands, as follows: Southern Pacific Railroad, of California, about 4,000,000 acres; the Dallas Military Road Company, of Oregon, about 1,200,000 acres, and other lands in Mississippi and Alabama.

The summary removal of subordinate officials in the Custom House at Havana, on account of alleged collusion with merchants in the illicit importations of goods, has given rise to reports of serious popular disturbance.

The new tea crop of Japan is taking the Pacific route to America instead of the old route through the Suez Canal. A cargo equal to 180 carloads has just arrived at Tacoma, Wash. Ter., to be forwarded over the Northern Pacific Railroad, who are dividing the traffic with the Canadian Pacific.

The Standard Oil Company, according to the Philadelphia *Ledger*, have given up their contracts for building barges for the coastwise oil-carrying trade, and have ordered tank steamships to be built instead. The barge which was to have been built by John Roach, Jr., at Chester, is to be changed into a steamship 200 feet long, and is to have a capacity of 250,000 gallons. The new craft will have triple expansion engines, and will be provided with all the known modern appliances for carrying oil in the coastwise and transatlantic trade.

The Russian naval authorities are putting petroleum-burning furnaces into the big iron-clad *Tchesme*, which is nearing completion at Sevastopol. This vessel is a line-of-battle ship of great size and power. Her displacement is over 10,000 tons and her armor is sixteen inches thick.

Premier Norquay, of Manitoba, says the new railroad to connect Winnipeg with the United States railway system will be finished in November next.

The Western lumber mills are boasting of the "biggest plank." The Diamond Match Company claim to excel, having sawn out from the Michigan forests a plank 16 feet long, 29 inches wide and 6 inches thick, clear as a bell, containing 232 feet.

## New England Nail Trade.

The Boston *Commercial Bulletin* reviews the position of our prosperous industry as follows:

The nail trade was a prominent New England, or more particularly a Massachusetts industry, and up to within the last 10 years this State was one of the important nail manufacturing centers of the country. Within the last decade, however, this section has steadily lost in importance as a seat of the nail industry; while the West, and more particularly the Pittsburgh and Wheeling districts, has shown a constant and handsome growth. The district of Eastern Pennsylvania and New Jersey, which is an important manufacturing center, has held its own, as it is in a good position to get cheap fuel and iron. The disadvantage which New England has labored under has been the much heavier cost of fuel and iron as compared with the West, and particularly the Pittsburgh district where both fuel and raw material are at the very doors of the mills. The coal costs laid down at the mills here from 50 cents to \$1 per ton more, and iron will average \$1 to \$2 per ton more than the cost to the Pittsburgh mills, owing to the long haul on the coal and iron from Pennsylvania to this section. The New England mills could not obtain, as an offset to this, lower labor in this section, as the nailers insisted upon obtaining fully as high wages as the workmen in the Western mills. The nail manufacturers have thus been ground between the upper and nether millstones. During the last five or six years not a mill in New England has made sufficient money to pay even a moderate dividend, and some of them have suffered a steady loss, and under the conditions which have prevailed, it is unquestionably only a question of time when the manufacture of iron nails in New England will be almost completely supplanted by the steel nail industry, as mentioned below. Within the last two years five of the New England nail companies have given up the business—namely, the Bridge-water Iron Company, the Weymouth Iron Company, the Fall River Iron Works, the Old Colony Iron Company and the Parker Mills. The first concern failed and has been reorganized as an iron manufactory; but will not again produce nails.

The second concern, after having kept up an unprofitable struggle for many years, wound up its affairs, and the mills are now unoccupied. The third concern sold out its property to the Globe Yarn Mills, of Fall River, and the old mills have been torn down and a cotton yarn mill erected on their site. The fourth concern sold out its plant and property at Somerset to the Mount Hope Iron Company. The Parker Mills, of Wareham, sold its plant to Tremont Nail Company.

The only mills now making nails in New England are the Tremont Nail Company, at Wareham; the Mount Hope Iron Company, at Somerset, and Rogers & Sheldon, at East Bridgewater. The productive capacity of the present mills is about 375,000 kegs, against about 600,000 kegs, which was the productive capacity of the mills in 1880. While the manufacture of iron nails is being slowly crushed out in New England there has been a very important change taking place in the nail industry in the West which promises to completely revolutionize the whole trade, as it has already done partially, and that is the manufacture of steel nails. In 1882 some of the manufacturers in the Wheeling district began the manufacture of Bessemer steel nails, and the experiment has succeeded so well and the industry has so developed, that at the present time over one-third of the nails produced in the Wheeling and Pittsburgh districts are steel. These nails are stronger, better and about as cheap as iron nails, and their manufacture is constantly growing at the expense of that of the iron nails, which they will unquestionably eventually supersede. The success of this steel nail, however, affords a new opportunity for New England manufacturers, and places some of them on about an equality with their Western competitors. Steel nails have been manufactured in New England for many years, but they were made from high-grade and high cost steel, and sold at about \$1 per keg above the ordinary iron nails. The success of the Western manufacturers with nails made from cheap steel attracted the attention of some of the New England manufacturers. Investigation satisfied them that these nails could be made as cheaply in New England as in Wheeling or Pittsburgh, as they can be produced from German basic Bessemer slabs or billets, which can be imported and laid down at the seaboard at about \$31 duty paid, while American slabs sell in Pittsburgh at \$32 to \$33 per ton.

The only process necessary for the conversion of these slabs into nails is rolling into plates and cutting into nails. Neither of these processes require much fuel, and both can be done by water power, so that the question of fuel does not enter largely into the cost, as it did when it was necessary to convert the pig iron and scrap iron into iron nail plate. The Tremont Nail Company have invested \$300,000 in a new and extensive steel nail mill plant at Wareham. The works are now complete and nails will be made this fall, and all the investors are confident of success. Wareham, being south of Cape Cod, is an excellent position to receive cargoes of coal or shipments of steel from New York. It may be that, through the manufacture of steel nails, Massachusetts will regain her old position in the nail industry.

During the week ending August 27 the four Chicago mills turned out the huge quantity of 15,329 gross tons of steel rails. This production was apportioned among the several mills as follows:

	Gross tons.
North Chicago Rolling Mill Company:	
North Chicago works.....	2,785
South Chicago works.....	4,318
Union Steel Company's works.....	4,258
John Steel Company's works.....	4,138
Total.....	15,509

These mills were not operated on extra turn during the week, but each one only the usual 11 turns. With such an achievement as this by its mills Chicago might well be called the Steel Rail City. No other city in the world can equal it.



## MECHANICAL.

## The Hill Friction Clutches.

We present on this page engravings of what are known as the Hill friction clutches made by the Hill Clutch Works, of Cleveland, Ohio. There are two types, designated respectively class "A" and class "B" clutches, the former having been on the market for several years past.

The "A" clutch, as shown in Fig. 1, is made with either two or four arms, according to the amount of power to be trans-

mitted, at least as far as the original inventor has been concerned, simply through the immense cost of the experiments. The ways of some inventors are rather mysterious—they seem to have a peculiar veneration for good workmanship, or to think that because a machine is well made and highly finished it must necessarily answer, when perhaps the principals on which it is constructed are radically wrong. Some inventors will construct elaborate machines without any previous trials or experiments worth speaking of. They then discover that the machine requires extensive alterations, but,

mental machine would only add to the inventor's difficulties. If an inventor makes a machine with the full knowledge that it will be thrown aside when it is done with, it gives him a freedom of action and room for the display of boldness—one of the most useful qualities in an inventor—which can never be attained by working on any other system. One of the most fruitful sources of trouble in an experimental machine is the accumulation of moving parts through unforeseen circumstances, especially in the interior, causing them to get in the way of each other, and rendering some portions dif-

be said to consist of several separate machines combined to form a whole, such as a driving gear, feeding arrangement, regulating apparatus, &c. In a case like this, these separate portions can at times be designed both as regards framing and moving parts, so as to admit of their being connected in the various relative positions they are likely to assume in the course of experiment.

We can give a very appropriate instance taken from our own experience of an error into which some constructors of experimental machinery fall as regards framing. A practical man, who should have known better, on carrying out an invention of his, made a machine the frame of which may be best described as a box turned upside down, and it was cast in one piece. Now, although this was a very good form for it to assume finally, it was ill-chosen for the purpose of experiment, as most of the moving parts being inside they were difficult of access—in fact, they could only be reached by raising the machine from the floor. It was then discovered that the frame was too small, not much, it is true, but in this case "a miss was as good as a mile," for the frame being cast in one piece it was impossible to enlarge it. The fact was that the inventor had been endeavoring to secure compactness at the wrong time, and, instead of accepting the situation and having another frame made either larger or else better suited to the purpose of experiment, he fell into another error and tried to crowd the working parts into a place really too small for them, and after rendering most of them useless through reducing them beyond their proper limits, and wasting an amount of time that would have sufficed to construct another machine, he became disheartened and abandoned the whole affair. Had we had the designing of this machine, we should have made a top plate supported by four uprights, or else by open side frames, so that had the machine extended itself unexpectedly in any direction latitude would have been allowed, and the necessity of discarding the whole frame would have been avoided. But we should certainly not have ventured to construct a boxed-in frame inclosing the working parts until we were quite positive about their positions and dimensions.

It has been our experience in these matters that there is what may be called a secondary stage in an invention. For instance, a machine may work after a fashion, but it may not work well enough or fast enough. The general principles on which it is constructed may be sound, but it may fail to come up to a certain standard. The causes of the defects may be trifling, but the inventor shrinks from making the necessary alterations, because in a case like the one we have just quoted he, being bound down by circumscribed limits, finds it almost impossible to make any alterations, and has to choose between two evils—namely, constructing another machine either entirely or partially, or else carrying his experiments into the secondary stage under a weight of super-added difficulties. An inventor should follow a policy at once bold and yet tentative—bold in design, but allowing the machine to possess tentative qualities—and he should remember the old adage, "Hope for the best, but prepare for the worst."

## The Edwards Balanced Steam Trap.

We show on this page two engravings of the Edwards balanced steam trap, representing a section and details of the main features. The trap has been in general use for a number of years, and in all cases, we understand, has given highly satisfactory results.

Its construction and manner of working will be readily understood from the illustrations. The float is made of cast brass in halves and screwed together. There is no possible chance of any collapsing of float even under the highest steam pressure. If there should be any water from the con-

accumulated enough the float rises and lifts the tubular stem N through the oblique shaped channel which opens the valve, giving full area and instantly discharging the contents. This longitudinal sliding movement between the channel and the float is never cut off, besides the rising and falling motion of the float is not impeded by any stuffing-box, and therefore there is no space left for leakage of steam. If placed in position where it is liable to freeze when steam is turned off, the pet cock on the bottom of the trap should be opened.

The advantages claimed for this trap are: There is no chance for collapsing of float; it has a perfectly balanced, double seated, discharge valve; it has also an automatic air valve to prevent its being air bound, and there are no stuffing-boxes or glands to prevent the free working of the lever and float. Since the trap was first introduced, it has found constant use in sugar refineries, on vacuum pans and in large breweries, besides at a great many paper mills and other factories throughout the country, and in every case, we are told, has worked with ease and regularity, requiring no repairs and causing no delays. It is put on the market by Mr. Amos Allen, 109 Liberty street, New York.

## Defective Blow-Off Valves for Boilers.

A defective blow-off is always a serious defect. If, says the *Locomotive*, it is in such a condition that it will not hold water, it is of course dangerous. All kinds of valves, whether straightway, globe, or any other form of construction yet devised for valves, are unsuitable things for closing blow-off pipes. They all have the grave defect that pieces of scale or other hard substances are liable to get under the valve and prevent its closing, and there is no way to tell whether this has happened in any particular case except by examining the end of the blow-off pipe after the valve is supposed to be closed, to see whether it leaks or not. Plug cocks, as they are ordinarily made, are always giving trouble by leakage; pieces of scale or other gritty substances cut the plug and body; they are liable to stick so that it is with great difficulty they can be opened, and various other things make them a source of much trouble, but for all this it is positively known at any time by a simple inspection of the plug itself whether it is shut or not, and the amount of leakage, if there is any, generally shows for itself around the plug, so we are inclined, in spite of its grave defects, to give preference to the common plug cock over any form of valve as a means of closing blow-off pipes.

But an improved form of plug-cock has within a few years been put upon the market (originally devised in England), which is without question superior to anything else for blow-offs. It is made of iron, is protected from corrosion, by Professor Barff's process, and is packed with asbestos. Wherever it has been tried it has given most satisfactory results, and is undoubtedly the best blow-off valve made.

## Economical Small Steam Engines.

We find in several English papers some figures showing a remarkable economy in small steam engines. The Royal Agricultural Society, of England, it appears, offered this year prizes of £100 and £200 respectively for the best non-compound and compound agricultural engines. The tests to determine the relative efficiency of the various engines entered were recently concluded at Newcastle. The engine which won the £200 prize was a compound steam jacketed portable, built by Davey, Paxman & Co., with 5½ inch and 9¼ inch cylinders and 14-inch stroke. On a run of 4 hours and 40 minutes this engine developed 20.85 brake horse power with 1.8 pounds of coal and 17.76 pounds of water per brake horsepower per hour. The steam pressure carried during the test was 150 pounds, and 9.14 pounds of coal were burned per square foot of grate surface, with a ratio of heating to grate surface of 54.5. The water mentioned is the amount actually supplied, and not the actual consumption, as the water from the jackets drained directly back into the boiler, and the condensation from the heater was also returned to the feed-water tank without

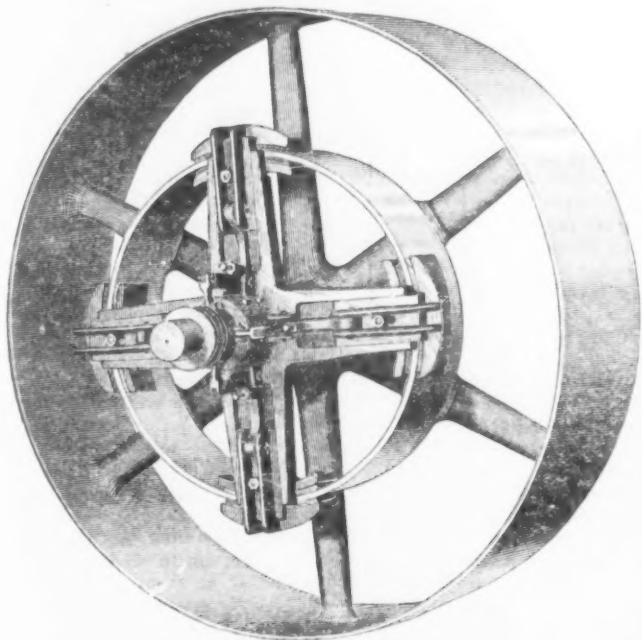


Fig. 1.—The "A" Clutch.

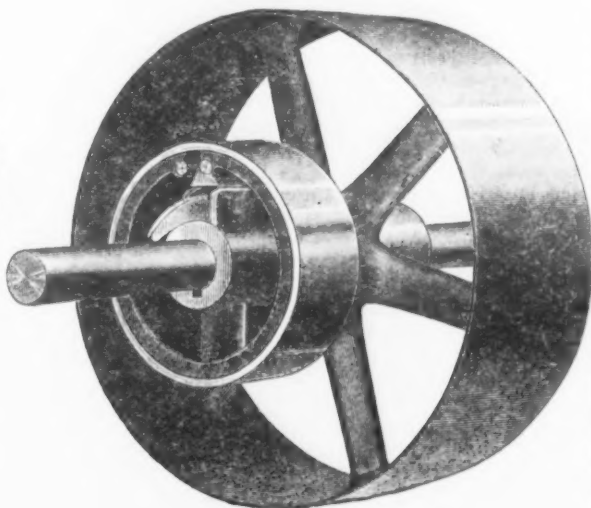


Fig. 2.—The "B" Clutch.

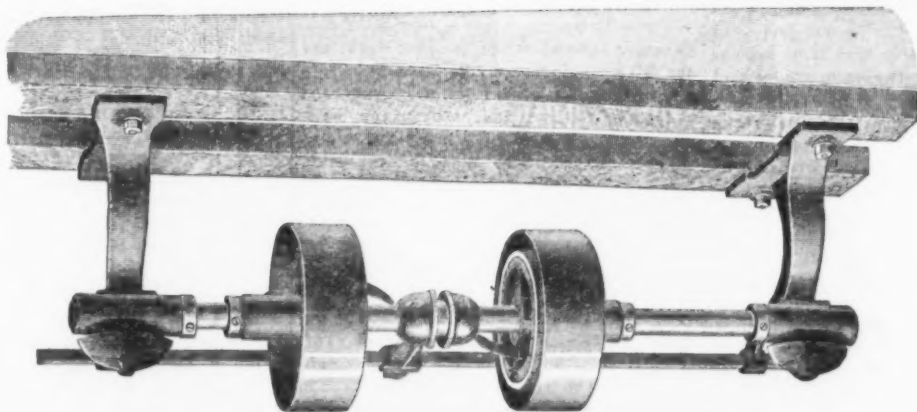


Fig. 3.—The "B" Clutch applied to a Countershaft.

THE HILL FRICTION CLUTCHES, MADE BY THE HILL CLUTCH WORKS, CLEVELAND, OHIO.

mitted. A clutch ring is cast to the arms of this pulley. The ring is turned and finished absolutely true, and is grasped on the outer and inner sides by the eight clutch members, which are shod with thoroughly seasoned maple. The radial motion of the jaws or clutch members, is produced by a sliding collar (seen to the left of the clutch) being pushed up toward the clutch, operating a link and two angle levers. These are connected with the clutch jaws in such a manner as to force the outer jaws inwardly and the inner jaws outwardly, until they grip firmly both sides of the ring, and also so that the sliding collar cannot be forced out. By moving the sliding collar out by means of a long lever attached to it, the jaws or frictional surfaces are instantly disengaged. The clutch is operated very easily and without start or jar to the machinery, and is key-seated securely to the shaft. The pulley, of course, runs loose on the shaft. The slight wear to the wood jaws is taken up by set-screws, and when worn out can be renewed. All parts of these clutches are made strictly to gauge, and duplicates of any part may be ordered by number to take the place of those worn out or broken by accident, and the new parts will fit in their place as perfectly as the old ones. The interchangeability of all parts of these clutches is a guarantee of their careful and accurate workmanship.

The new clutch B supplements the A clutch, which is made only as small as 18 inches in diameter, while the B clutch is made as small as 6 inches in diameter. The operation will be understood at a glance. The clutch consists of an outer and inner ring. The outer ring is sometimes cast into the arms of the pulley, or, as shown in Figs. 2 and 3, fastened to the hub of the pulley. The pulley with the outer ring runs loose on the shaft, while the inner ring is key-seated securely to the shaft. The clutch is operated by means of a sliding collar being pushed up against a small lever, the latter operating upon a wedge, which expands the inner ring against the outer ring, holding it securely. The clutch is fitted up with an automatic grease cup, which lubricates the frictional surfaces and prevents wear, but this does not in any way prevent its holding firmly. As stated above, this B clutch can be manufactured as small as 6 inches in diameter, and in consequence of this, and the fact that it can be made very cheaply, is well adapted for use on counter shafts. Fig. 3 illustrates an example. Friction clutch cut-off couplings are made in both the A and B styles.

## Experimental Machinery.

In a recently published article the Engineer, of London, conveys some sound advice to inventors and builders of experimental machinery:

In producing mechanical inventions, says our contemporary, the importance of conducting experiments with rapidity and economy cannot be overestimated. It is impossible to say how many inventions have

having been made in the first place as if it were perfect, it does not admit of that easy or rapid alteration that a machine of this class should; so it often has to be thrown aside and another one made. Perhaps the next machine is nearer the mark, the inventor having profited somewhat by his first failure, but still it may not attain the desired result, and so it goes on, and it is in this manner that some inventors conduct their experiments, if indeed they can be called such, for these machines are not, strictly speaking, experimental machines at all. They are made in the hope that they will answer the inventor's purpose, and are often entirely destitute of the characteristics which a machine constructed for the purpose of testing the value of an inventor's ideas should possess.

It should be remembered that the expense of making a final machine after the experiments have been brought to a successful issue is often but a small item in the cost of producing an invention. Even if an inventor possesses the requisite knowledge, it is not always that the circumstances of the case will admit of his designing a machine so that it can retain its original form when it is perfect. There is but little affinity between a perfect machine and an experimental one. Even in improving an existing machine it will be found that this is often the case, for the very compactness of a machine will prevent alterations and additions. Of course the reader must use discrimination as to what class of machine these remarks apply. In an invention of which types exist closely resembling it a careful consideration of the matter should prevent the inventor designing anything very wide of the mark; but where he plays the part of a pioneer in a new field the case is different—for instance, in a machine for working a hitherto unused material, where the results are sometimes so unlike the preconceived ideas of the inventor. Therefore, we would advise an inventor, if the machine which he is about to construct is at all complicated, or involving unusual combinations, to make it in a purely experimental form and keep it in that state until it is felt that the experiments have come to an end. What we mean by an experimental machine is this: a machine for testing practically the value of the inventor's ideas, one that will allow the alterations, additions or enlargements so often found to be necessary to be made with ease and rapidity, and which, when it has done its work, will serve as the foundation on which to model the final machine.

This idea is the outcome of considerable experience with inventors and inventions, and, in our opinion, possesses many advantages. For instance, in working on this system, when the final machine comes to be made it will often be found that a considerable quantity of work can be omitted which at an earlier stage was thought to be indispensable, and compactness, economy and elegance of design can then be considered, when attempts to do so in the experi-

ment of access or enlargement. This points to the importance of framing in this class of machine. In fact, in some cases it is simply impossible to say what shape the framing will eventually take. It has been found best in these circumstances to make the frame in separate portions, these portions being only what were actually required for the accommodation of the moving parts, which, when their dimensions and relative positions have been found, will then develop the frame. There is room for the

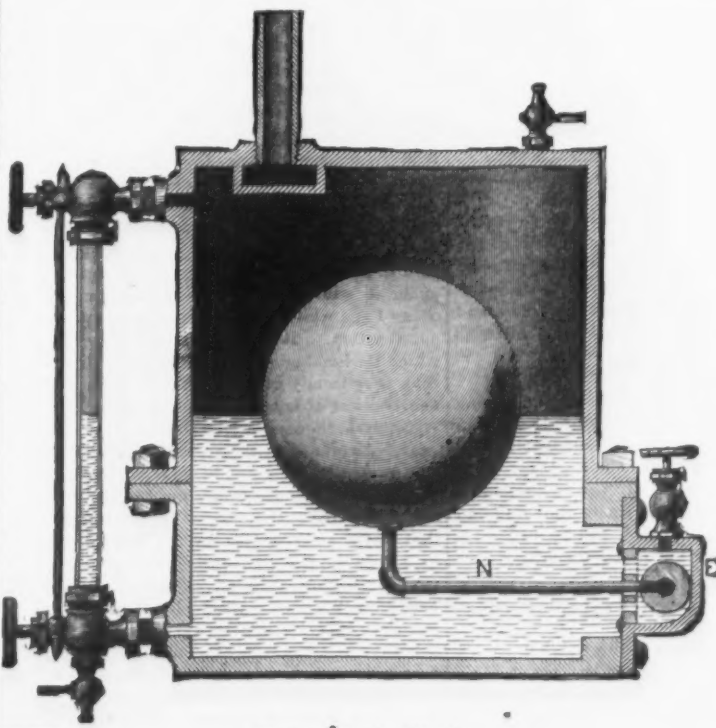


Fig. 1.—Vertical Section.

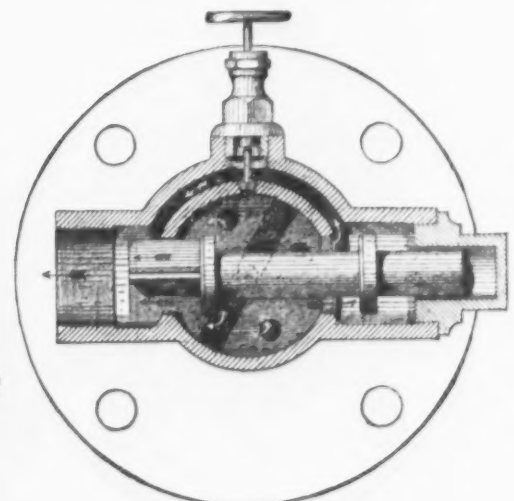


Fig. 2.—Enlarged View of Outlet Valve.

## THE EDWARDS BALANCED STEAM TRAP.

display of a great deal of judgment in designing the framing of an experimental machine, particularly in making provision for the contingency of having to alter the positions of the moving parts, as with a little forethought this may often be done without entailing any extra work. For instance, in complicated cases it is often very difficult to determine the relative positions of the various important parts of a machine. Therefore it is sometimes advantageous to construct what may be termed the component parts independently, so that the best arrangement may be arrived at by actual trial. This applies to cases where a machine may

condensation of moisture collect inside the float A, it will instantly pass off through the tubular stem N and the channel in the outlet-valve, as shown in Fig. 2. The outlet-valve E, being always below the water line, no steam can escape, thereby making a perfect separation of steam and water. In the illustration, the outside casing F is a round cast-iron pot made in two parts and bolted together with flange joints. The water of condensation enters at the top at B, and is discharged at E. This discharge valve is shown in Fig. 2. It has two seats and is perfectly balanced. The operation of the trap is as follows: When condensation has

being measured. The evaporation on this basis—i. e., the water supplied, is 9.85 per pound of coal. This engine has side frames of channel section, mounted on the top of a locomotive boiler. The low pressure cylinder has a single slide valve, and the high pressure a slide with cut-off on its back, the action of the cut-off valve being controlled. That such an economy, surpassing that of many large condensing mill engines, can be accomplished with a small portable engine and boiler will surprise many, and will no doubt be welcomed by the advocates of compounding as an example of what their system is capable.



# Trade Report.

## British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, AUG. 31, 1887.

**Scotch Pig.**—The market is a little steadier. Scotch warrants are 42/6. Makers' brands are quoted as under:

Coltness, alongside, Glasgow	43/6
Langloan	43/6
Glenarnock	43/6
Gartsherrie	43/6
Shotts	43/6
Dalmellington	43/6
Carnbroe	43/6
Eglinton	43/6
Summerlee	43/6

Carriage from Ardrossan to Glasgow is 1/10 ton.

**Bessemer Pig.**—The market is a little steadier. We quote W. C. Hematites, Nos. 1, 2 and 3, 44/6 @ 45/6.

**Cleveland Pig.**—The market is unchanged, at the following prices: 37/ for No. 1 Foundry; 36/ for No. 2; 35/ for No. 3, and 34/ for No. 4 Forge.

**Bessemer Billets.**—Bessemer Billets, 2 1/2 x 2 1/2 inches, are higher at 82/6 @ 85/; which is also quoted for 7 x 7 inch Blooms.

**Bessemer Crop Ends.**—We quote run of mill 52/6 @ 54/6.

**Manufactured Iron.**—The market is a little steadier. We quote:

Staff, Ord. Marked Bars	5 0 0 @ 5 10 0
" Medium	5 0 0 @ 5 10 0
" Common	4 15 0 @ 5 0 0
Hoops, 20 W. G. and over	5 0 0 @ 5 10 0
" Common Best	5 10 0 @ 5 10 0
" Medium	5 10 0 @ 5 10 0
" Common	5 0 0 @ 5 10 0

Sheets, 20 W. G. and under: Ordinary Best, 5 10 0 @ 6 15 0; Common, 5 10 0 @ 6 0 0.

Welsh Bars are quoted 24/ 2/6 @ 24/ 5/.

**Steel Rails.**—The market is unchanged, with quotations at 24/ 2/6 @ 24/ 7/6.

**Old Rails.**—The market for Old Rails and Scrap is irregular. We quote T's, c.i.f. New York, 67/6 @ 70/; and Double-Heads, 70/.

**Copper.**—The market is unchanged, Chili Bars closing 40/ 5/ @ 40/ 10/; and Best Selected 45/ 10/.

**Tin Plates.**—The market is unchanged. We quote:

Tin Plates, 10x14, 1st qual. Charcoal	17 @ 18
" 2d	16 @ 17
" 3d	15 @ 16
" 4d	14 @ 15
" 5d	13 @ 14

**Lead.**—We quote Common English 12/ 2/6 @ 12/ 5/.

**Spelter.**—This metal is firmer. We quote 14/ 17/6.

**Freight.**—Freights from Glasgow to New York are 8/6.

## Financial.

Office of The Iron Age, WEDNESDAY EVENING, AUGUST 31, 1887.

General trade accounts indicate a wider distribution of goods this season compared with one year ago. Representatives of interior markets who are now in New York in considerable force, speak of a large and satisfactory trade in motion. Among New York dry goods jobbers the packing and shipping departments are now hard pressed. In the grain market San Francisco troubles have a depressing effect, as it is known that some 15,000,000 or 20,000,000 bushels of wheat lately in control of the clique, including 5,000,000 held by the Liverpool banks, are liable to go for what they will fetch. Provisions are dull and easier; lard in buyers' favor. Cotton is barely steady. Hemp easier. India rubber firm and a better demand. Leather quiet. Petroleum steady. Sugar is active with a large business. Tobacco steady. Wool quiet. In ocean freights room for cotton is scarce and in demand.

The Stock Exchange markets this week have been generally unsettled, first by the failure of the brokerage firm of Groveteen & Pell, which caused a heavy break on Thursday, and the day following the market was severely raided, Richmond Terminal and Reading dropping heavily, together with Oregon and Transcontinental, partly recovering at the close, and on Saturday there was a rallying tendency. On Monday there was little apparent change. On Tuesday the bear movement was renewed, and on the announcement of the failure of Robert Hare, Powell & Co., in Philadelphia, the prominent stocks dropped several points. London cables were also lower. The decline in Manhattan, Lackawanna, and the Grangers was conspicuous. To day, the market was feverish but stronger. The announcement was made authoritatively that an arrangement had been entered into between the Oregon and Transcontinental Company and a foreign syndicate headed by the Deutsche Bank of Berlin, in pursuance of which almost the entire floating debt of the O. T. Co. will be paid off immediately, about \$6,000,000 being applied to this purpose. The transfer of the Baltimore and Ohio Express to the United States Express was also announced. The consideration named is \$2,500,000.

The weekly statement of the associated banks showed an increase of \$600,000 in surplus reserve, due almost entirely to the contraction of loans, which showed a loss of

\$2,275,700, and deposits were decreased \$1,732,000. The surplus now amounts to \$1,865,700, and the general resources of the banks do not differ materially from the situation one year ago. Bank accommodations are confined mainly to the mercantile classes, whose requirements are larger than usual. Announcement is made of the assignment in Philadelphia of Robert Hare-Powell & Co., with liabilities estimated at \$1,500,000, and assets, \$4,000,000. In a circular to their creditors, the firm, who are engaged in coal mining, attribute their difficulties to the inability of Charles E. Pennock & Co., of the Pennock Rolling Mills, to meet their maturing paper. Following so closely the collapse of the California wheat deal, the Ives entanglement, &c., a feeling is created unfavorable to the speedy restoration of confidence. According to the Custom House statement the imports of specie at this port during the week were \$1,182,760, including \$390,000 in gold bars from Havre, and \$270,000 in gold from Havana. Since January 1 the imports are \$11,707,000, against \$7,421,000 for the same time last year.

Contrary to expectation the Bank of England rate remains at 3%, the American demand for gold being diverted to Paris, which is now the cheaper market, although the London Economist remarks that the position of the American money market is "the dominating factor" in determining rates in London. The posted rates for bankers' sterling are \$4.81 1/2 @ \$4.85. The market is easier.

The clearing house returns from 36 cities show an increase of 2.9%, against a decrease of 9.2% the previous week; outside of New York the gain is 10.6%; compared with last year there is a moderate gain.

The official statement of the commerce of the United States for July makes a very unfavorable showing as far as the balance of trade is concerned, the imports for the month having reached \$60,007,648, while the exports fell \$8,000,000 below that amount, the total being only \$51,879,579. The difference in the balance of trade between the first seven months of 1885 and the first seven months of this year is adverse to this country nearly \$100,000,000, since during the former term the United States exported \$62,340,999 more than they imported, while during the latter term they imported \$20,339,570 more than they exported. In spite of these conditions specie is now flowing this way, puzzling the statisticians. The most plausible explanation is that American securities have of late been transferred to Europe in amounts far exceeding the usual estimate. On this subject the *Financial Chronicle* remarks: "From certain known facts it is a fair presumption that a large portion of the money raised for carrying on the railroad extensions now in progress has been thus secured. Hence, although the trade situation is so out of harmony with the conditions of the foreign exchange market and of the gold import movement now in progress to New York, these suggestions furnish reason, we think, for believing that our adverse trade balance has been very largely offset by securities taken in a permanent way."

The imports of merchandise at this port during the week were larger, amounting to \$8,725,243, of which nearly \$3,000,000 represents dry goods. Since January 1 the imports amount to \$311,345,928, as compared with \$284,481,000 for the corresponding period last year, and \$256,680,000 in 1885. The exports were valued at \$6,508,965, making a total since January 1 of \$201,525,289, as compared with \$210,283,000 for the same time last year, and \$221,527,000 in 1885. The items include \$99,000 bushels of wheat, 17,964 bales of cotton, and 9,000,000 barrels of petroleum.

The condition of the Savings Banks of this State, as shown by the statement of the Superintendent at Albany, is highly favorable. July 1 the total resources were \$587,685,000, against \$552,779,000 in 1876, and the deposits for six months amounted to \$94,061,000, as compared with \$87,801,000 for the corresponding period in 1876.

The stockholders of the Market Bank voted to consolidate with the Fulton Bank, which have about the same proportion of surplus to capital.

The corner stone of the Consolidated Stock and Petroleum Exchange Building will be laid September 8, and an attempt is making to render the occasion memorable.

## NEW YORK.

**American Pig.**—The market has shown no change during the week, the leading features which have characterized it for so long a time, still ruling it. There have been rumors to the effect that a large block of Southern Iron had been placed for future delivery. So far as we can learn the facts are that a Southern maker has offered to sell 10,000 tons for 1888 delivery, but that no takers were found. Forge Iron continues weak. We quote No. 1 Foundry, \$21 @ \$22; No. 2, \$19 @ \$20, and Gray Forge, \$17 @ \$18. Southern Irons are quoted \$20.50 @ \$21 for No. 1 and \$18 @ \$19 for Silvery Bright, according to quality, which varies widely.

**Scotch Pig.**—The market continues quiet and steady. During the week one round lot went into store, and a small parcel on dock was offered at concessions. We quote Coltness, \$22.25 @ \$22.75; Glenarnock, \$20.75 @ \$21.25; Gartsherrie, \$21 @ \$21.25;

Summerlee, \$22 @ \$22.25; Dalmellington, \$20.50 @ \$21; Clyde, \$20.75 @ \$21.25; Eglinton, \$20 @ \$20.50.

**Bessemer Pig and Spiegeleisen.**—No business reported.

**Bar Iron.**—No features of any note have developed during the week. From the South come reports that a number of car orders have been placed lately. We quote 1.85¢ @ 1.9¢ for Common, 1.9¢ @ 1.95¢ for Medium, and 2¢ @ 2.25¢, on dock, for round lots.

**Structural Iron.**—New business continues to come up, and sales of considerable magnitude in the aggregate are reported. We quote for large quantities: Angles, 2.4¢ @ 2.6¢; T's, 2.75¢ @ 2.8¢; Bridge Plate, 2.4¢ @ 2.5¢; Channels and Beams, 3.30¢, base on dock.

**Plates.**—The mills are busy. Considerable inquiry is made for Foreign Steel Sheets, and large orders have gone abroad, with others to follow. According to grade these Steel Sheets are selling from 2.4¢ @ 3¢, for No. 10 to No. 16 gauge, figures which are far below those of American makes, so that the entire trade threatens to go into the hands of foreign producers. The quality of the material is certainly excellent in some cases; but, on the other hand, it is claimed that lots are occasionally damaged considerably by rust, in transit. It is stated that a number of cases are now being investigated in Washington, in which undervaluations on Steel Sheets have been made. We quote: Common or Tank, 2.40¢ @ 2.50¢; Refined, 2.50¢ @ 2.60¢; Shell, 2.65¢ @ 2.90¢; Flange, 3.50¢ @ 3 1/2¢; Extra Flange, 4.25¢ @ 4.50¢. For Steel Plates quotations are as follows: Tank, 2.75¢ @ 2.9¢; Ship, 2.9¢ @ 3¢; Shell, 3¢ @ 3.25¢; Flange, 3.3¢ @ 3.5¢, and Fire-Box, 3 1/2¢ @ 4¢, on dock.

**Steel Rails.**—A good many sensational reports have been printed during the past week about an alleged "drop" in Steel Rails, the burden of a good many of the reports being that there has been a decline of \$2 1/2 ton. It is possible that these reports may have arisen from the circumstance that some mills which were still nominally holding at \$39 at mill saw fit to come down to \$37, while others showed their willingness to take winter and spring orders at \$36. Late fall and early winter work has been down some time past at \$37, but 1888 business has not been placed to any extent thus far, although there is little doubt that the majority of the mills would be willing to accept \$36. We must emphasize again that winter orders are always taken at concessions, and that these were more likely this year, since the prospects of full employment of the mills in 1888 are not as bright as were those a year since in respect to 1887. The mills will this year make a little over 2,000,000 gross tons, which, according to the 1887 allotment was distributed as follows:

	1887 allotment, gross tons.
Edgar Thomson and Homestead	249,130
North Chicago	241,644
Pennsylvania	199,130
Bethlehem	199,130
Cambria	158,111
Lackawanna	158,111
Seranton	158,111
Joliet	158,111
Union	131,563
Troy	101,962
Cleveland	98,549
Western	80,340
Worcester	27,347
Total	1,961,139

For 1888, as we have already stated, the allotment is distributed by percentages, one concern having 13.5%, and another 12.5%, one 9.8%, one 9.0%, five works each 8%, two 4.5%, one 4.8% and one 1.4%, which shows changes in favor of some works. In at least one conspicuous instance preparations are going forward to enlarge capacity, which in 1888 will not be less than 2,250,000 gross tons. It is evident that unless there were some check to unlimited production like that provided by the allotment system, there might be a rapid return to unremunerative prices. Competition under it will be active enough to insure cheap rails while guarding against utter demoralization. It is a circumstance for which Rail-makers deserve far more credit than they usually get, that they were able to nearly meet a demand which jumped from 1,560,000 tons to over 2,000,000 tons in one year, without carrying prices to boom figures. The impression seems to be general that the prices realized in 1887 were far higher than has really been the case. It is probable that they were nearer to \$35 @ \$36 than to \$38 @ \$39 for the whole year, since the works filled up rapidly on the rise, and very few contracts were placed at \$40 at Eastern mill, although that figure was quoted for a considerable time. As yet few orders for 1888 delivery have been placed, and comparatively few inquiries are in the market. Among the recent sales is one lot of 5000 tons for the South. We quote \$36 @ \$36.50 for 1888 delivery; \$37 @ \$37.50 for late 1887, and \$37.50 @ \$38 for early delivery, standard sections.

**Nail Slabs.**—We note a sale of 500 tons. We quote \$31 @ \$31.50.

**Wire Rods.**—Some business has been done for early delivery, for which \$42 is asked by importers. Negotiations are in progress.

**Scrap.**—The market is dull at \$21 @ \$22 for yard Scrap.

**Old Rails.**—Among the sales recently reported is one lot of 500 tons of Tees, at New Haven, at \$24; one lot of Double-Heads, afloat, at \$24, and a lot of 1500 tons shipment, at \$24.25. Consumers bid \$24, on

cars, Jersey City, equivalent to \$23.50 from store, and \$24 for Double-Heads.

**Old Wheels.**—The types made up report last week a sale of 400 tons, as 4000 tons. The market is quiet, with no transactions reported.

**Track Material.**—At its meeting last week, in this city, the Spike Association made no change in prices. We quote: 2.40¢ @ 2.50¢ for Spikes; 2.15¢ @ 2.25¢ for Angle Bars; 3¢ for Square Bolts, and 3.25¢ for Hexagon Bolts.

## Metal Market.

**Copper.**—A dispatch was received last night at the Calumet and Hecla office in this city to the effect that the mine was unsealed yesterday. Further details will probably soon be forthcoming, so as to be able to form some judgment. At the close of last week the business in Lake Copper continued on a large scale, about 2,000,000 pounds having been taken out of the market for delivery in September, and including January next, at 10 1/4¢ spot; 10.80¢ @ 10.85¢ September; 10.90¢ @ 10.95¢ October; 10.95¢ @ 11¢, November; 11.05¢ Dec., and 11.10¢ January, but since the beginning of this week offerings have been so light, except at much advanced prices above buyers' views, that business has been interfered with for the moment. The position, however, remains strong, and it appears that those who have invested in Copper, being fully alive to the strength of the situation, are content to wait and see how far the disaster at the Calumet and Hecla will influence prices before the end of the year. Import of Copper from the United States into Liverpool and Swansea from January 1 to August 15, 6856 tons, against 9972 tons same time last year. London quotes Best Selected 45/ 5/, while Chili Bars have ranged as follows: August 25, 40/ 7/6, and since then, including to-day, 40/ 5/.

**Tin.**—There has been a very large consumptive demand during the past week, and our fall arrivals this month have been rapidly taken hold of for interior consumption at from 23.10¢ to 23.25¢, cash; futures, however, have been rather pressed for sale at slightly higher prices than the preceding week, but still at a great discount from spot prices—namely, September delivery at 22.80¢; October at from 22.65¢ to 22.55¢; November and December at from 22.50¢ to 22.45¢. London has remained steady at £102. 15/ spot, but futures have this week advanced fully 25/ 1/2 ton from the lowest point, say to £102. 10/, with a very large business doing. Confidence seems to have been much restored in England, owing to the increased demand for consumption there. The Billiton sale at Batavia came off to-day, averaging 61.75 guilders 1/2 picul. Tin Plates.—A fair demand has prevailed during the week; stocks are light, and makers are catching up on deliveries very slowly. We quote on a stiff market, large lines, 1/2 box, as follows: Siemens-Martin Steel, Charcoal Finish, \$4.75 @ \$5; ditto, Coke Finish, \$4.60 @ \$4.65; Ternese, \$4.30 @ \$4.35, and Coke Tins, \$4.45 @ \$4.60. Liverpool quotes Coke, 13/6, and Charcoal, 15/ @ 16/.

**Lead.**—Our market has been dull and nominal, the range for Common Domestic being \$4 55 @ \$4.65, some sales being made the latter part of last week to go to near-by places at \$4.60 @ \$4.65. As Lead is worth \$4.50 at Chicago, it can be shipped to points in this vicinity cheaper from here than from the Western centers of distribution. Refined changed hands in a moderate way at \$4.67 1/2, but, being scarce and wanted, \$4.70 would have to be paid to day. London improved 2/6, Soft Spanish to £12 and English Pig to £12. 5/. Manufacturers are quoted as follows: Pipe, 7¢; Sheet, 7 1/2¢; Tin Lined Lead Pipe, 15¢; Block Tin Pipe, 40¢; Drop Shot, \$1.40, ditto, 5 lb, 33¢; Buck and Chilled, \$1.65; ditto, 5 lb, 38¢, all less the usual trade discount.

**Spelter and Zinc.**—A fair demand has been noticeable within the range of \$4.50 @ \$4.80, Common Domestic as to brand, while Silesian is higher, and has now to be quoted \$4.95, having advanced to £14. 15/ in London. We quote Bertha Refined, 7 1/2¢ @ 8¢ as to quantity. Sheet Zinc is moving off steadily at 6¢ @ 6 1/2¢, Domestic.

**Antimony.**—Has been selling to a moderate extent, Hallett being wanted at 8 1/2¢ @ 8 3/4¢, and Cookson at 9¢ @ 9 1/4¢, the former remaining at \$36 10/ in London.

## New York Metal Exchange.

The following sales are reported:

THURSDAY, AUGUST 25.	
200,000 lb Lake Copper, December	11.10¢
50,000 lb Lake Copper, December	11.05¢
25,000 lb Lake Copper, September	10.75¢
100,000 lb Lake Copper, October	10.925¢
50,000 lb Lake Copper, October	10.95¢
100 tons Lead, October	4.60¢
10 tons Tin, September	22.75¢

FRIDAY, AUGUST 26.	
100,000 lb Lake Copper, spot	10.75¢
100,000 lb Lake Copper, September	10.80¢
175,000 lb Lake Copper, October	10.95¢
50,000 lb Lake Copper, September	10.80¢

MONDAY, AUGUST 29.	
25,000 lb Lake Copper, October	10.90¢

## Philadelphia.

Office of The Iron Age, 220 South Fourth St., PHILADELPHIA, AUGUST 30, 1887.

**Pig Iron.**—There has been no change of any importance since date of our last report, unless it may be that there is rather more disposition on the part of large consumers to place orders. That is, they will buy when

they can get a concession of about 50¢ 1/2 ton from the asking rates, otherwise they hold off. There are some parties who are willing to accept \$17 at tide for good Gray Forge, and several 1000-ton lots have been placed, but the supply at that figure seems to be pretty well exhausted, but it is hard work to get \$17 50, which is the usual asking price. Some fair iron could still be made available at \$17, but quality is not such as consumers care to venture upon, while at \$17.50, the supply of standard brands is quite liberal. Furnaces south and west of Philadelphia report an improving demand from other sections, so that there is a fair probability that the pressure to realize on this grade of Iron may not be as urgent as it was during the past two months. No. 1 Foundry Iron is still scarce, as regards favorite brands, with \$21 @ \$22 at tide, covering both extremes, although there are brands—said to be of good quality—offering at a little under \$21, but for some reason, the preference is for well known brands regardless of the difference in cost. No. 2 Foundry is in good supply, and while \$19.50 is usually quoted, orders for good-sized lots could be placed at \$19 @ \$19.25, and where quality is not thoroughly established \$18 @ \$18.50 would be about all that could be realized. From this it will be seen that there is pretty close discrimination in regard to quality, and a price that one party might accept might have very little influence on others who are well sold up, with plenty of inquiry for additional quantities. On the whole it seems probable that the demand during the next 60 days will be heavy enough to absorb all the good Irons offering at about to-day's quotations, so that for the present a steady and firm market may be looked for, with a fair degree of confidence in values.

**Foreign Iron.**—Advices from abroad are all firm, and in some cases higher prices are quoted. A 5000 ton lot German Spiegeleisen, 10% @ 12%, is said to have been taken at about \$22, with \$22.75 asked for English. Bessemer is nominally \$20.25, but there is no demand for large lots.

**Blooms.**—There is a moderate amount of business passing, and prices are steady as last quoted—viz., \$30 @ \$30.50 for Rail Blooms; \$31 @ \$31.50 for Nail Slabs; \$32.50 @ \$34 for Sheet Iron Billets, and \$35 @ \$36 for Siemens Martin. Domestic Blooms as follows: Charcoal Blooms, \$53 @ \$54; Run-out Anthracite, \$45 @ \$46; Scrap Blooms, \$33 @ \$39 "bloom" ton.

**Muck Bars.**—Prices are a shade firmer, \$31 at mill being a very inside price, with quite of number of sales in small lots at \$31.50, which is now generally asked.

**Bar Iron.**—There is quite a good demand for Bars, and most of the mills have all the work they can attend to. Some get 2.1¢, firm, others, whose brand is not quite as favorably known, are taking business at 2¢, but the best makers are firm at 2.1¢. Country mills appear to be marketing their product in their own vicinity, as the amount offering for city delivery is very trifling and pretty well up in price. There is a good deal of inquiry for Bars yet, but buyers do not like to pay over 2¢, and for some specifications only about 1.95¢, delivered, is bid. Meanwhile sellers consider that they can do better than that, and are willing to see the business taken by country mills, or any others that may want it, at that figure. On the whole the position looks more favorable than it did a week ago, as there is more business offering and less disposition to shade prices. Some improvement is noted in Skelp Iron also, with sales of 1000 tons Grooved at about 1.95¢, and 1.97 1/2¢ @ 2¢, asked.

**Plate and Tank Iron.**—Quite a number of orders are on the market, none very large individually, but in the aggregate are somewhat important. The mills are so full of work, however, that it is no easy matter to place an order for early delivery, and most of them are of that character. The position is very encouraging to sellers and the prospects favorable for continued activity during the entire balance of the year. Prices firm at about the following rates: Ordinary Plate, 2.40¢; Tank, 2.45¢ @ 2.50¢; Shell, 2.6¢ @ 2.7¢; Flange, 3.5¢; Fire-Box, 4¢; Steel Plates, Tank, 2.8¢; Shell, 3¢ @ 3.2¢; Flange, 3.3¢ @ 3.4¢; Fire-Box, 3 1/2¢ @ 4¢.

**Structural Iron.**—The position shows no change from that of last week. There is plenty of work on hand, a liberal amount still on the market and more in prospect, at firm quotations. This covers the entire field, so that further comment is unnecessary. Prices are about as follows: 2.5¢ for Bridge Plate; 2.4¢ for Angles; 2.8¢ @ 2.9¢ for Tees, and 3.3¢ for Beams and Channels.

**Sheet Iron.**—The market is quite active, and all the mills have as much business as they can handle. Prices are steady, with something of a firmer tone, but no quotable change can be made. Sales at about the following figures:

Best Refined, Nos. 26, 27 and 28	31¢
Best Refined, Nos. 18 to 25	34¢
Common, 4¢ less than the above	
Best Bloom Sheets, Nos. 28 to 32	44¢ @ 45¢
Best Bloom Sheets, Nos. 22 to 25	44¢ @ 45¢
Best Bloom Sheets, Nos. 16 to 21	34¢ @ 35¢
Blue Annealed	2.8 @ 3 ¢
Best Bloom, (galvanized, discount)	50 ¢
Common discount	63 ¢

**Steel Rails.**—The market is rather quiet, although all the mills have an abundance of orders for the present. Inquiries for large lots are being made, however, and it is likely that important contracts will be closed soon,



Southern Coke, No. 1 Foundry .....	\$29.50	\$21.50
"    "    No. 2                 .....	19.50	30.50
"    "    No. 3½               .....	30.00	19.50
Hanging Rock Coke, No. 1 Foundry .....	20.50	21.50
Southern Charcoal, standard brands .....	21.50	22.50
Silver Gray, different grades .....	18.50	20.00
Southern Coke, No. 1 Mill, Neutral "    No. 2                 .....	18.75	16.25
"    No. 3                 .....	18.00	15.50
"    Cold Blast           .....	18.50	18.50
Charcoal, No. 1 Mill .....	16.50	20.00
White and Mottled, different grades .....	13.00	17.50
Southern Car-Wheel, standard brands .....	24.00	27.00
Southern Iron, different grades .....	21.00	25.00
Hanging Rock, Cold-Blast .....	25.00	27.00
Hanging Rock, Warm-Blast .....	23.00	24.00



Rolled Blind Hinges, Nos. 232 and 234.....dis 56 & 10  
Rolled Plate.....dis 70 & 10  
Rolled Raised.....dis 70 & 10  
Plate Hinges } 8, 10 & 12 in.,     B.....34¢  
                      } over 12 in.,     D.....34¢

**Spring Hinges—**  
Geer's Spring and Blank Butts.....dis 40 ¢  
Union Spring Hinge Co.'s Pat. March 1892.....dis 40 ¢

Acme, Crow, Empire and U. S. ....	dis 20 1
American, Gem, and Star, Japanned.....	dis 30 1
American, Gem, and Star, Bronzed.....	dis 20 1
Oxford, Bronze and brass.....	net
Barker's Double Acting.....	dis 20 10 1
Union Mfg. Co. ....	dis 25 1
Bommar's .....	

Chicago.....  
Gate Hinges—  
Western.....

N. E. ..... \$10.40, dis 56 1/2  
N. E. Reversible ..... \$10.40, dis 56 1/2  
Clark's, No. 12 S. .... dis 60 1/2 to 60 1/2  
V. S. St. .... \$10.40, dis 56 1/2  
Automatic ..... \$10.40, dis 56 1/2  
Common Sense ..... \$10.40, dis 56 1/2  
Seymour's, Nos. 1, 2, 10 and 30 ..... dis 60 1/2 to 60 1/2  
Shepard's, No. 3, ..... dis 60 1/2 to 60 1/2  
Blind Rings—  
Parker ..... dis 75 1/2 to 75 1/2  
Lamer ..... dis 60 1/2 to 60 1/2  
Seymour ..... dis 60 1/2 to 60 1/2  
Bull & Porter ..... dis 75 1/2 to 75 1/2  
Wilson ..... dis 60 1/2 to 60 1/2  
Bull ..... dis 60 1/2 to 60 1/2  
Clark's, No. 1, 3, 5, 40 and 60 ..... dis 75 1/2 to 75 1/2  
Clark's Mortise Gravity ..... dis 60 1/2 to 60 1/2  
Sargent's, No. 12 ..... dis 75 1/2 to 75 1/2  
Sargent's, No. 12 ..... dis 75 1/2 to 75 1/2  
Reading's ..... dis 75 1/2 to 75 1/2  
Shepard's, No. 1, 3, 5, 40 and 60 ..... dis 75 1/2 to 75 1/2  
Shepard's Niagara Gravity, Nos. 1, 3 and 5 ..... dis 75 1/2 to 75 1/2  
Shepard's Niagara Gravity, Nos. 1, 3 and 5 ..... dis 75 1/2 to 75 1/2  
Shepard's Champion Gravity, No. 7, ..... dis 75 1/2 to 75 1/2  
Shepard's Combust Gravity, No. 10, ..... dis 75 1/2 to 75 1/2  
Shepard's, No. 1, 3, 5, 40 and 60 ..... dis 75 1/2 to 75 1/2  
Shepard's O. S. Bull & Porter ..... dis 75 1/2 to 75 1/2  
Shepard's, No. 1, 3, 5, 40 and 60 ..... dis 75 1/2 to 75 1/2  
Clark & Bull & Porter, No. 1, 3, 5, 40 and 60 ..... dis 75 1/2 to 75 1/2  
Automatic Blind Rings, Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677



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# Trade Report.

## General Hardware.

Business continues to go on satisfactorily to all classes of trade. There has been no great change in prices, and values are generally well sustained. The advance in Copper has caused a stronger feeling, but without quotable change in Copper Rivets and Bars and other goods made from Copper and Brass.

The New York Barb Wire market is quiet, but considerable orders are being received from Western points, and the outlook for the fall trade is pronounced bright. Prices remain unchanged at 4.10¢ @ 4.12½¢ for carload lots of Four Point Galvanized Barb Wire, 4.30¢ for 3-ton lots, and 4.4¢ for smaller lots.

### NAILS.

The New York Nail market is moderately active, but is weaker, there being some pressure to sell on the part of a few concerns. We quote \$2.10 @ \$2.15 for lots of Iron Nails, from store, with the usual abatement for carload orders. At a meeting of the Eastern Association, yesterday, 17 works were represented. It is reported that the meeting was quite harmonious. A preliminary report from the committee, bearing on allotments, was presented, but referred back for some modifications. From the West come reports which indicate that the rigid Nail pool proposed there, the provisions of which we gave an outline, has been abandoned. This has been due to the fact that the stockholders of the Jefferson Iron Works, of Steubenville, Ohio, and the Bellaire Nail Works, of Bellaire, Ohio, two of the large mills of the Wheeling district, refused their sanction to the entrance of the companies into the Nail pool. It is understood that the presidents of the companies in question were not personally adverse to the plan. Whether or not an agreement could be reached on the basis of a simple allotment of make, such as is proposed by the eastern mills, remains to be seen, especially if the scheme of the latter should be carried through. The necessity of concerted action throughout the country is keenly felt by the large majority of Nail manufacturers. Fierce and long continued competition may indeed crowd weaker works to the wall, and by natural causes an equilibrium between supply and demand may be brought about. But it is pretty thoroughly understood that the capacity for doing injury of even the weakest manufacturers is enormous, and that even then, when one set of men has been ruined, another is likely to take hold of the same work, at a valuation for plant so much lower that for a while they can sustain the struggle. The condition of the Nail trade is hopeless enough under such circumstances to cause a repetition of efforts to put it on a sounder basis by mutual concessions.

The enormous demand for Wrought-Iron Pipe which was felt last year has led to a great increase of productive capacity that the market has become overdone, and a weakness is showing itself in both Black and Galvanized. For jobbing lots we quote the following discounts from the list of March 23, 1887:

	Per cent.
1½ and under, Plain	45
1½ and under, Galvanized	37½
1½ and over, Plain	57½
1½ and over, Galvanized	47½
Boiler Tubes	45

The Rope boom continues, the chief feature of it being the advance in Sisal, which is now almost as dear as Manila. Sisal Hemp is still very scarce, and held at extraordinary figures. We quote as follows, subject to a discount of 1½ per cent. for cash in 30 days:

	Per pound.
Manila, 1½ inch and larger	136
Manila, ¾ inch	125½
Manila, 1 and 1½ inch	136
Manila Tanned Rope	119½
Manila Hay Rope	126
Sisal, 1½ inch and larger	113½
Sisal, ¾ inch	124½
Sisal, 1 and 1½ inch	128½
Sisal Tanned Rope	118½
Sisal Hay Rope	114½
Sisal Medium Lath Yarn	114½

By an error in the advertisement of the Alford & Berke Company, 77 Chambers street, New York, printed in our last issue, the prices given were those of last year. The correct figures will be found this week.

Dennison & Hamilton, 144 and 146 Lake street, Chicago, Ill., invite the attention of the trade to Amber Mica, which they offer at very much lower prices than North Carolina Mica can be obtained for. They recommend it as an excellent article, especially for use in repairing old stoves, &c. It is free from spots, and they claim that in point of cleavage or splitting it is superior to North Carolina Mica. They quote the following net prices on the sizes given below. Other sizes can be furnished, for which they will give quotations on application:

	Per lb.		Per lb.
3 x 4	\$1.75	4 x 4	\$2.25
3 x 5	2.00	4 x 5	2.50
3 x 6	2.25	4 x 6	2.75
3 x 8	2.50	4 x 8	2.75

The Union Hardware Company, Torrington, Conn., have issued a handsome illustrated catalogue and price list of their manufactures other than Skates, including Dog Collars, Gun Implements, Wood and Leather Goods, &c. A separate list of Skates will be published.

On page 19 will be found the advertisement of Harrington & Richardson, Worcester,

Mass., in which they illustrate their new Automatic Double-Action Revolvers, which automatically eject the shells upon being opened for re-loading, and their Double-Action Shell Ejecting Revolvers, in which the shells are ejected when the center pin is pushed back. The manufactures of this firm are very well and favorably known to the market, and the trade will find these goods worthy of their attention.

In the new catalogue of their celebrated Blue Line Lumbering Tools, Morley Bros., East Saginaw, Mich., present illustrations, price lists and full descriptive matter, which makes this pamphlet a very complete and useful guide to all interested in this line of goods.

Emmick & Hatcher, manufacturers of the Columbus Wrought Steel Thimble Skein, Columbus, Ohio, issue a list of Skeins, which has been compiled with great care and is very complete. It begins at the smallest sizes and runs up to the largest, giving prices with nuts or burs or with sheet steel, and every set with their name stamped on is warranted exact as to weight and thickness. Their guarantee is as strong as it can be, and they offer to fill sample orders on the understanding that the Skein will please both purchaser and his customer in every particular "or no pay." In order to impress upon the minds of the trade the distinguishing mark placed upon their goods, they issue a circular containing a *fac simile* of the label, which is pasted on all goods made by them. Their advertisement will be found on page 44.

The Clark Mfg. Company, Buffalo, N. Y., announce that they expect to occupy their new factory about September 15, and will be prepared to execute all orders promptly for Clark's Blind Hinges, Gate Hinges, &c., of which goods they make a specialty.

A reference to the new advertisement on page 38 of W. H. Jacobus & Co., Hardware manufacturers' agents, 90 Chambers street, New York, will show a considerable addition to the establishments represented by them to the list contained in previous announcements.

We have received the illustrated catalogue of the Model Mfg. Co., of Pa., manufacturers of patented Hardware, whose factories and office are in Philadelphia. The following are the articles illustrated therein: Model Mixer and Beater for cake, dough, chemicals, &c.; special Clamp for attaching to the table when desired; Model Fruit Press, which they claim to be the only Fruit Press manufactured that does not allow the juice to come in contact with the metal; Model Combination Tool, including Nut Cracker, Nail Puller, Monkey Wrench, Hammer, two sizes of Gas Pliers, Wire Cutter and Pincers, all of which seem from the illustration to be good and practical tools, made in two sizes and various styles; Model Bread, Meat and Vegetable Slicer; Model Automatic Smoked Beef Shaver; Model Combined Metal Shears, Punch Bar and Rod Cutter, of which they say that No. 1 will cut a long plate of metal ¾ inch thick easily, and will cut square or round rods up to ¼ inch, and punch holes in light sheet metal, No. 2 being heavier; Model Scissors Sharpener; Model Bottle Filler, for bottling establishments of all kinds where corking is not required to be done under a pressure, or where the liquor to be bottled does not foam; Model Beer Bottling Machine. In introducing their goods to the trade, they say:

In calling your attention to our various specialties, we desire you to note particularly the superiority of our Smoked Beef Shaver over all others; that our Fruit, Wine and Jelly Press has no equal; our Bread and General Slicer supplies a long-expected want; that our Model Combination Tool, two sizes of which are made, is one whose every part is practical, and it is a superior seller; that our Combined Metal Shear, Punch Bar and Rod Cutter, of which we make two sizes, fills an actual need and is a superior tool. An inspection of the principles of our Beater and Mixer will at a glance show its merits. While we are aware our Beer Bottling Machine is not directly in the line of the Hardware trade, many merchants can sell same by merely directing attention to some local bottlers. The merits of the machine will do the rest. We will spare neither pains nor expense to maintain a high standard of excellence in everything that leaves our factory.

Montgomery & Co., 106 Fulton street, New York, request us to inform the trade that during the past week they have received from the other side an invoice of fine 8 inch Razor Hones, and also a large assortment of F. L. Groet's celebrated Swiss Files.

We have received from W. F. Janeway & Co., 27 East Spring street, Columbus, Ohio, an illustrated catalogue and price list of their manufactures, which include Tinware of all kinds, besides Household Utensils and other domestic goods. In their announcement to the trade they desire to call attention particularly to their class A, Pieced Tinware, which in quality and price they speak of as unsurpassed. They also refer to their set of Tin Plate, Sheet Iron, Wire, Zinc, Rivets and Tinners' stock and trimmings in general, which they have on hand. As they import their Tin Plates direct, they state that they can quote very low prices. The catalogue contains some 80 pages, and is classified by letters into the following chapters: Heavy Pieced Tinware, Sundries in Pieced Tinware, Common Cheap

Ware, Agate or Granite Ware, Stamped Ware and Tinners' Trimmings, Japanned Ware, Spoons and Miscellaneous Goods, Hollow Ware, Maslin Kettles, &c. The pamphlet is bound in black paper, stamped in imitation of alligator leather, is printed neatly, and is gotten up in a serviceable shape.

William J. H. Gluck, of 96-100 North Gay street, Baltimore, Md., sends us a couple of circulars and price lists relating to seasonable goods. One refers to Coal Hods and Galvanized Water Buckets, the various goods being illustrated and accompanying price lists of the different sizes given. The other circular refers to Stove Boards and includes a long list of these articles, together with tables of sizes, shapes and accompanying prices. In issuing this price list particular attention is directed to the new edge on his Zinc and Crystallized Boards, which he speaks of as being exceptionally durable. He further states that this edge will under all circumstances lie flat on the floor.

### SARGENT & CO.

have just issued, under date of August 10, their discount sheet No. 8, accompanied by several pages of new goods and a pamphlet illustrating the line of goods which they make in the Ekado design. This is a very handsome line of uniform style goods, which are only made in real Bronze, and will not be made in iron. They say of it:

"The 'Ekado' is a departure from the prevailing style of Hardware ornamentation, and was originated and patented by us for use upon our first-class Bronze Metal Door Locks and Trimmings. It has met with such general favor that we have been forced into manufacturing a full line of Bronze Metal House Trimmings to match. The artistic merit of this design will surely be appreciated by architects, and from our Lock catalogue and this book may be selected the Ekado Design Hardware for the whole house."

Among the articles illustrated in the pages of new goods, we notice particularly a line of Chandelier Hooks, with screw for gas-pipe and safety snap; also a line of Chandelier Hooks, made with a base to cover any break that may be made in the ceiling by the screw.

They also illustrate a line of Iron Bench and Block Planes, the manufacture of which they have entered on. There is nothing very new in the construction of these Planes, but the Irons are tempered by an improved process from which important advantages are expected.

The following are the discounts (to which should be added 10 per cent. for prompt cash) on Bronze Plated Goods, from the prices in their pamphlet of January, 1887:

	Dis. per cent.
1. No. 438, Loose Joint Butts	70
2. No. 138, Loose Pin Butts	70
3. No. 438, " Yeddo Bronze Butts	70
4. No. K 438, " Butts	70
5. No. K 440, " Butts	70
6. No. K 440, " Butts	70
7. No. 1405, Parliament Butts	70
8. No. K 415, Shutter Hinges	60
9. No. K 415, " "	60
10. No. K 415, " "	60
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98. No. K 415, " "	60
99. No. K 415, " "	60
100. No. K 415, " "	60

The following are the discounts (besides 10 per cent. extra discount for prompt cash) from Ekado design goods, spoken of above, from the list in their pamphlet which accompanies the discount sheet:

	Dis. per cent.
1. No. C 886 E, Loose Joint Butts	60
2. No. C 843 E, Loose Pin Butts	60
3. No. C 886 E, Shutter Hinges	60
4. No. C 815 E, " "	60
5. No. C 843 E, " "	60
6. No. C 886 E, " "	60
7. No. C 886 E, " "	60
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98. No. C 886 E, " "	60
99. No. C 886 E, " "	60
100. No. C 886 E, " "	60

The following are their discounts (besides 10 per cent. extra discount for prompt cash) on goods of their own manufacture, as shown in their 1884 catalogue, including such changes in list as have not been previously printed:

	Dis. per cent.	156.
No. 20, Narrow Fast Joint Butts	35 & 35	160.
No. 20, Broad Fast Joint Butts	35 & 35	161.
No. 50, Loose Joint Butts	60 & 60	162.
No. 152, " "	60 & 60	163.
No. 152, " "	60 & 60	164.
No. 152, " "	60 & 60	165.
No. 152, " "	60 & 60	166.
No. 152, " "	60 & 60	167.
No. 152, " "	60 & 60	168.
No. 152, " "	60 & 60	169.
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No. 152, " "	60 & 60	174.
No. 152, " "	60 & 60	175.
No. 152, " "	60 & 60	176.
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No. 152, " "	60 & 60	178.
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No. 152, " "	60 & 60	181.
No. 152, " "	60 & 60	182.
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No. 152, " "	60 & 60	184.
No. 152, " "	60 & 60	185.
No. 152, " "	60 & 60	186.
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No. 152, " "	60 & 60	189.
No. 152, " "	60 & 60	190.
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No. 152, " "	60 & 60	197.
No. 152, " "	60 & 60	198.
No. 152, " "	60 & 60	199.
No. 152, " "	60 & 60	200.



cannot recover the entire quantity of lead originally put into a plate, although the weight of a worn out plate is practically the same as that of a new one; there is necessarily some loss in the reversion of peroxide and sulphate into metallic lead, which may be valued at between 30 and 40 per cent, in money, inclusive of labor and fuel used in the furnaces. All the above figures are approximate only; the exact values can only be ascertained when all the factors are known, and among the principal factors are: firstly, the size and total weight of a car; secondly, the nature of the road and the speed to be applied; thirdly, the number of cars supplied by one charging station; and, lastly, the cost of fuel, labor and all necessary materials.

A dispatch from St. Paul, Minn., dated August 25, states that a natural flow of oil and gas has been discovered near Ft. Snelling, in the suburbs of St. Paul. A number of gentlemen have secured a lease of the land immediately adjoining the place where the discovery was made. It is stated that oil comes to the surface in such quantities that it can easily be gathered. There is also a fissure in the earth, from which gas escapes and burns brightly when ignited. A stock company are also boring for gas at South St. Paul.



**L. COES'**  
GENUINE IMPROVED  
**Knife Handle**  
PATENT  
**Screw Wrenches**  
MANUFACTURED BY  
**L. COES & CO.,**  
Worcester Mass.  
ESTABLISHED IN 1839.




Patented July 6, 1880. Patent July 8, 1884.  
Registered March 31, 1874.

Sectional view illustrates our NEW KNIFE HANDLE, showing Malleable Iron Frame and Shank of Bar keyed into position.  
Straight Bar, Extra LONG NUT FOR SCREW IN JAW

The Best Made and Strongest Wrench in the Market.  
Send for Illustrated Price List and Circular.

**J. C. McCARTY & CO.,**  
NEW YORK,  
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Our Eureka Patent Flexible Back Saws, the teeth of which are hard, the back being soft, thereby preventing them from breaking in two, have been greatly improved and are giving the best satisfaction. Our Crescent brand of Hack Saws are hardened all through with uniform temper, and are the best Hack Saws so tempered.

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## Henry G. Thompson & Sons,

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Flexible Back Band Saws for Cutting Metals,  
Hack, Meat and Kitchen Saws and Frames.

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**American Tin Zinc Company,**  
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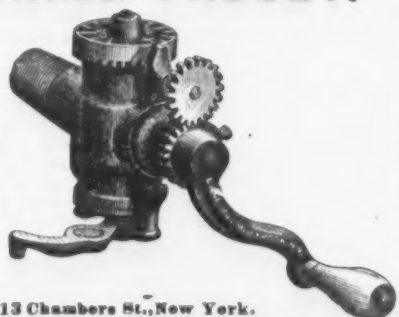
or Light or Heavy Molasses, Oils,  
Varnishes or other Fluids.

We warrant these Faucets to be as represented, measuring correctly and working more easily in heavy molasses than any Measuring Faucet in the market. No groover can afford to be without them, for they save time, and "time is money." They insure perfect cleanliness, requiring no tin measures or funnel to collect dirt and draw flies. They do not drip. They prevent all waste, as no molasses or other fluid can pass except when the crank is turned. They are the embodiment of simplicity, and consequently they are always in order. They work easily in the heaviest molasses. They are warranted to measure correctly, according to U. S. Standard.

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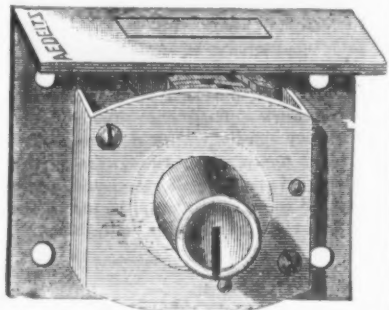
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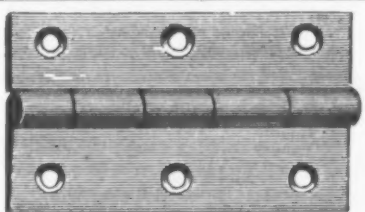
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**HARDWARE.**

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ALWAYS GIVES THE  
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Main Belting Co.,

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THE LEVIATHAN

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Strength, Durability and

Cheapness.

Made to any length,

Width and Strength.

Main Driving Belts.

Guaranteed to Run

Straight, Even Through-

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No Cross Joints, Un-

affected by Damp.

Clings well to the Pulley.

Has no equal. In fact,

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Best Steel Springs, Malleable Iron Crank.

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For Engines, Machinery, &c.

This paint being entirely free from acid  
will not corrode or rust the iron.

**PATENT IRON FILLING.**

A composition or filling for Tools, Machin-  
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Ships, and all ironwork for buildings, inside  
or out. Send for sample card, price list and  
testimonials.

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Nos. 136, 138 and 140 N. 4th St., Philadelphia.



Patent Portable Rope Hoist.

The best quick lift made. Quickest,

lightest and cheapest.

Three sizes, 10, 15 and 2000 lbs. Just

the thing for quick lifting and lowering.

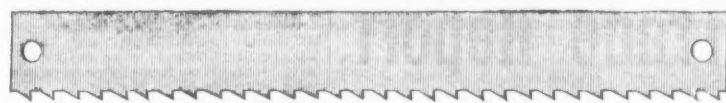
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ence.

ENERGY MFG. CO.,

1115 to 1123 S. 15th Street,

PHILADELPHIA PA.



ANY HARDWARE DEALER

in any place can have all the trade in

## BUTCHER SAW BLADES

if he will take the trouble to show the Star Blades to the Butchers and permit them to try their quality. There is not a single place where these Blades have been used that they have not taken and held the market. They can be sold for 10 Cents each, and that is less than the cost of filing a common saw. They are so hard that one will cut three or four times as long as the saws now in use without filing. As these Saws are not to be filed, and as one only lasts a few months before getting dull, a great many of them are wanted. They are listed on the 50th page of our new Catalogue which we will send on demand.

MILLERS FALLS CO., 93 Reade St., New York.

## STAR BUTCHER ★ SAW BLADES.

Length.	Width.	Gauge.	Teeth to Inch.	Per Dozen.
14 and 16 in.	1 in.	24	9 1/2	\$1.08
18 " 20 "	1 1/2 "	24	9 1/2	1.20
22 " 24 "	2 "	24	9 1/2	1.32



**CHAMPLAIN**  
Forged Horse Nails.  
MANUFACTURED BY THE  
**NATIONAL HORSE NAIL CO.,**  
Vergennes, Vermont.  
HOT FORGED AND COLD HAMMERED POINTED. MADE OF BEST  
NEWCASTLE IRON AND WARRANTED  
WAREHOUSE  
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J. C. McCARTY & CO. Sole Agents.

## INDURATED FIBRE WARE. SEAMLESS

Pails,  
Tubs,  
Basins,  
Keelers,  
Milk Pans,



Spittoons,  
Umbrella Stands  
Water Coolers,  
Slop Jars,  
&c., &c.

Molded in one piece from wood pulp. Treated chemically, giving great strength and durability, and at same time making the ware impervious to liquids, hot or cold. Being neither painted nor varnished it will not impart taste to anything put in it, and will not further absorb liquid or odor so as to become heavier or foul. Is very light. Has no hoops to drop or rust off. Warranted absolutely seamless and unaffected by extremes of weather.

EVERY ARTICLE WARRANTED.

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BRASS GOODS MFG. CO.,

Manufacturers of Stamped Brass, Silvered and Tin Goods, Hyatt's Patent Brass and Iron Spring Bolts, Bronze and Plated Thimbles, Roses, Plate Escutcheons, Socket Shells, &c., Mucilage Brushes, Patent Mirror Pin Cushion Business Cards, Mirrors for Perfume Bottles, Hyatt's Patent Sensible Safety Pins. Novelties of New Designs made to order.

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Modern Molding and Pattern-Making; A practical Treatise Upon Pattern Shop and Foundry Work. By J. P. MULLIN. \$2.50

Practical Brass and Iron Foundry's Guide. Fifth edition, revised. By JAMES LARKIN. \$2.25

Brass Founders' Manual. By WALTER GRAHAM. \$0.50

Founding of Metals. Fourth edition. By EDWARD KIRK. \$2.50

Molder's and Founder's Pocket Guide. New edition, with supplement on statutory and ornamental molding, ordnance, malleable iron castings, &c., by A. A. FESQUET. By J. OVERMAN, M.E. \$2

Practical Metal Worker's Assistant. Revised edition. By OLIVER BYRNE. \$7

## Drawing and Designing.

Mathematical Drawing Instruments and How to Use Them. By F. E. HOLME. \$1.50

Architectural Engineering and Mechanical Drawing Book. 140 pages, 5 1/4 x 8 inches, 300 illustrations, cloth, No. 1. By ROBERT SCOTT BURN. \$1

Mechanical Drawing Self-Taught. By JOSHUA ROSE. \$4

Manual of Industrial Drawing for Carpenters and Other Wood-Workers. 29 plates and many illustrations, 176 pages, 8vo, cloth. By W. F. DECKER. \$2

## Mechanics and Shop Practice.

Treatise on Toothed Gearing. Containing Complete Instructions of Designing, Drawing and Constructing Spur-Wheels, Bevel-Wheels, Lantern Gear, Screw Gear, Worms, &c., and the Proper Formation of Tooth Profiles. By J. H. CROMWELL. \$2

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Pocket-book of Mechanics and Engineering; 18th edition, revised and greatly enlarged, with original matter, 660 illustrations, 671 pages, 16mo pocketbook form. By JOHN W. NYSTROM, C. E. \$3.50

## MANUFACTURING.

### Iron and Steel.

One of the number of new furnaces built by Lean & Blair, engineers and contractors, of Pittsburgh, for the Detroit Copper and Brass Rolling Mills, was tested on the 22d ult., with very gratifying results. They are heated by artificial gas generated in a battery of producers located in a separate building, and conducted to the furnace by underground flues. The advantage of producing the gas in separate generators, instead of firing each furnace directly with coal, has long been demonstrated by practical results in iron and steel works. The furnaces are so constructed as to allow of perfect combustion and uniform distribution of the heat by simply regulating the amount of air and gas introduced into them. This firm are also building a number of producers to heat the benches of retorts of the Detroit Gaslight Company.

The Ironton (Ohio) Register of the 25th ult. says: "Ironton Furnace has banked up. Indications in their business point to a reorganization of the company, when the furnace will again start. A meeting of stockholders is called for September 2."

The Martin's Ferry Stove Works, Martin's Ferry, Ohio, were completely destroyed by fire on the 24th ult., causing a loss of \$50,000, partially covered by insurance. These works have been peculiarly unfortunate, having been damaged to the extent of about \$1500 by a cyclone last year. It is not known as yet whether they will be rebuilt.

The East Chicago Rolling Mill Company have been organized at Chicago, with a capital stock of \$500,000. The incorporators are Miffie E. Bell, J. L. Pfaff, John W. Marsh and Valentine H. Marsh. The company will erect a large plant near Chicago, and will make principally structural iron, channel beams and eye bars. M. V. Smith, of Smith & Laughlin, engineers and contractors, of Pittsburgh, has been appointed consulting engineer of the company, and is at present in Chicago on business pertaining to the erection of the plant.

Of the 20 blast furnaces in Allegheny County, Pa., all are in successful operation with the single exception of one Shoenberger furnace, which is being prepared for blast and will probably go in during the present month. When this furnace blows in the make of pig iron in the above district will reach about 20,000 tons per month, more than was ever produced in this locality before.

On the 26th ult. Furnace "E" of Carnegie Bros. & Co., Limited, at Braddock, Pa., was blown in, after being thoroughly relined and repaired. All the furnaces of this company at the above place are now in successful operation, six of them making about 7500 tons of Bessemer pig iron every week, and the other one, which is running on spiegel, making about 500 tons per week. The two Lucy furnaces, at Pittsburgh, also owned by the above firm, are producing about 3000 tons per week. From this it will be seen that this firm are by far the largest producers of pig iron in this country.

The Spang Steel and Iron Company, Limited, of Pittsburgh, have received an order for the steel plates to be used in the construction of the boilers for the new Fall River steamer Poritan, which will be built at the shipyards of John Roach's Sons, Chester, Pa. The specifications call for the best fire-box steel that can be produced.

Fayette Brown, receiver of Brown, Bonnell & Co., of Youngstown, filed his June report in the United States Circuit Court week before last. It indicates a balance on hand on June 1 of \$7,065.77; the receipts during the month were \$305,215.89, making a total of \$312,281.66. The disbursements during June amounted to \$285,468.76, and the balance remaining on hand at the end of the month was \$36,812.86.

The new mill of Zug & Co., Limited, proprietor of the Sable Iron and Nail Works, at Pittsburgh, was started up on double turn on the 29th ult.

The management of the Reading Iron Works, at Reading, Pa., have determined to pay their employees weekly, although it will not go into effect for several weeks. The semi-monthly pay day has necessitated additional clerical work, and it is argued that with very little additional trouble the men could be paid every Saturday. The plan originated with the managers themselves, and is heartily approved of by the employees.

No. 5 furnace of the Pennsylvania Steel Works, at Steelton, Pa., was blown out last week for repairs.

The Bessemer steel department of the Jefferson Iron Works, at Steubenville, Ohio, is idle at present. It is not known when operations will be resumed.

The Western Forge and Rolling Mills, East St. Louis, are preparing for the manufacture of railroad links and pins, in addition to their regular specialties. The outlay involved in the erection and equipment of the necessary addition will not fall far short of \$25,000. When these improvements are completed the company's working force and pay roll will be largely increased.

On the morning of the 28th ult., the extensive works of the Morse Bridge Company, at Haselton, near Youngstown, Ohio, employing about 300 men, were burned to the ground. The fire caught in the boiler shop. Several bridges in course of construction were consumed. The loss is between \$90,000 and \$100,000, covered by \$98,000 insurance. The works will be rebuilt at once.

The Western Iron Company, of Peoria, Ill., have been incorporated; capital stock, \$50,000; for the manufacture of iron. Incorporators: H. George Westerman, E. H. Keith and E. A. Vansant.

The Scottsdale Iron Works of W. H. Emerson & Co., at Scottsdale, Westmoreland County, Pa., to whose failure we recently referred in these columns, will be sold at auction September 6, by the assignee, W. Minor Smith, president of the Windsor

Locks Steel Company, of Connecticut. The efforts of Messrs. W. H. Emerson & Co. to obtain an extension, under the terms of which business could be continued, were not successful.

The casting made at the Union Foundry last week, and stated in these columns as weighing 20,000 pounds, should have read 40,000 pounds, more or less.—Catawauqua (Pa.) Dispatch.

The new foundry of William Mann & Co., New Castle, Pa., now in process of construction, will be in operation in a couple of weeks.

The Union Foundry and Machine Company, at Catawauqua, Pa., are turning out an order for 400 iron columns for a large market in New York City.

No. 1 furnace of the Carbon Iron Company, at Parryville, Pa., which has been undergoing repairs for some time, has been blown in.

No. 4 furnace of the Allentown Iron Company, at Allentown, Pa., burned out on the 21st ult., and is now out of blast for repairs. The furnace had been in blast for only 10 months.

Dunbar Furnace No. 2, at Dunbar, Fayette County, Pa., has been blown out for repairs, and stack No. 1, recently completed, has been blown in. Repairs will at once be begun on No. 2.

The Briggs Iron and Tool Company, Findlay, Ohio, have made arrangements with the Findlay Rolling Mill Company, who are located upon their premises, to supply them with all the manufactured iron required by them in the future. This will save them both delay and expense of shipping, a heavy item in their expense account.

A roll of the great plate mill at Homestead, Pa., of Carnegie, Phipps & Co., was broken recently, doing considerable damage to the train.

### Machinery.

A dispatch from Findlay, Ohio, under date of August 24, says: The Zschech & McLane Machine Works, of Logan, Ohio, and the Hudnut Machinery Company, of Big Rapids, Mich., formed a consolidation today and will at once remove their respective plants to this city and engage in the manufacture of saw-mill steam engines and mill machinery. The new works will employ 125 skilled laborers.

The Chalmers-Spence Company, of New York, have just closed a contract with the Southern Cotton Oil Company for a large quantity of their new "C" Asbestos Removable Covering, which is to be placed on all the pipes, boilers and other appliances requiring a non-conducting covering of their new mills. The contract was placed by Mr. T. K. McKnight, their Pittsburgh agent.

The Link Belt Machinery Company, of Chicago, are just completing one of the largest plants for handling coal in the United States. The machinery is for the Pennsylvania Coal Company, at Milwaukee, Wis. By this arrangement all the coal is unloaded, screened, assorted and reloaded automatically by a system of link belt elevators and conveyors. Their special machinery department is also taxed to its full capacity.

The new foundries in the Alabama iron region are adopting the "Colliery" Cupola Furnace, of which Messrs. Byram & Co., of Detroit, Mich., are the exclusive manufacturers.

The National Iron and Brass Works, at Dubuque, Iowa, have just closed a contract with the city authorities at Fremont, Neb., for a one million gallon Smedley compound duplex pumping engine, the pumping engine now in use in that city being unsatisfactory.

The E. & G. Brooke Iron Company, Limited, will erect a large machine shop in Birdsboro, Pa., for the Pennsylvania Diamond Drill Company. The building will be on Furnace street, and be 78 feet wide by 123 feet in length. L. H. Focht has been awarded the contract for the erection of the building, and work will be commenced at once.

The annual meeting of the stockholders of the William Anson Wood Mower and Reaper Company will be held at their office in Youngstown, Ohio, on Monday, September 12.

Pringle & Boyce's machine shop at Long Island City was burned on Sunday night. Loss, \$10,000.

### Hardware.

It is reported that the tackers and nailers who were formerly employed at the American Tack Works, in Fairhaven, Mass., are contemplating starting the works in New Bedford, formerly operated by Messrs. Thayer & Judd.

The business of the White Mountain Freezer Company, at Nashua, N. H., increased about \$50,000 last year. The company are now employing 150 hands, and will probably enlarge their works at an early day. An average of a carload of manufactured goods are shipped daily.

The recent death of W. A. Souther left the office of president of the Missouri Bolt and Nut Company, of St. Louis, vacant, and made a new election of officers necessary. This has been held, and with the following result: President, E. E. Souther, formerly vice-president; vice-president, F. E. Codding; secretary and treasurer, John W. Good.

The Cyclone Novelty Company have been incorporated at Chicago for the manufacture of household utensils and novelties. The capital will be \$100,000. Among the specialties to be made will be John L. Maxwell's patent Churn Dasher and Washing Machine, but a number of other household goods will be turned out. A suitable location is now being sought, and when that is found the preparations for manufacturing will be energetically pushed.

The Ohio Lantern Company, whose removal from Bellare to Findlay, Ohio, was noted in these columns some time ago, commenced operations at the latter place on the 25th ult. The company will manufacture

seven different styles of lanterns and hand lamps, and will have a capacity of from 300 to 400 dozen per day.

A number of the employees of the Oliver & Roberts Wire Company, Limited, of Pittsburgh, went out on a strike last week, against the employment of non union men. It is expected that the trouble will be settled in a few days.

### Miscellaneous.

Messrs. Laughlins & Co., Limited, proprietors of the Eliza furnaces at Pittsburgh, have almost completed the erection of 150 coke ovens, which will supply coke to the furnaces.

The Calumet Coke Company, of Westmoreland County, Pa., with a capital stock of \$20,000, were granted a charter on the 26th ult. Ralph Bazaley, a capitalist of Pittsburgh, is one of the stockholders.

The Weber Wagon Company, of Chicago, have let contracts for rebuilding their factory lately destroyed by fire, and will be in full operation by October 1. They have commenced manufacturing, and will be prepared to fill all orders in a few weeks.

E. A. Humphreys, of Everson, Pa., who operates the furnace coke ovens at that place, has signed the same scale of wages as that signed by the H. C. Frick Coke Company, which was published in these columns last week. The agreement will date from August 16, 1887, and extend to August 16, of next year.

A. Mugford, Hartford, Conn., has just issued a new number of his "Manufacturers' Exchange," containing specimens of wood engraving. It is in all respects a most attractive pamphlet and of interest to all having occasion to use engravings, electrotype-work and illustrated catalogues.

The extensive bridge works of Morse Brothers, at Haselton, a suburb of Youngstown, Ohio, were totally destroyed by fire at an early hour on Sunday morning. The fire started in the engine room and spread very rapidly. The city Fire Department responded to a call, but were unable to do anything on account of defective apparatus. The works were running night and day, employing 300 men. All the machinery, tools and stock on hand were destroyed. The loss is estimated at \$100,000, with an insurance of \$98,000. The works will be rebuilt at once.

The following table taken from the Marquette (Mich.) Mining Journal of the 20th ult. shows the shipments of Lake Superior ore by ports to that date for this season, and for the corresponding period of 1886:

Name of Port.	1887.	1886.
Marquette	1,462,839	518,405
Escanaba	1,157,861	881,107
St. Ignace	50,290	32,431
Ashland Wis.	693,599	374,082
Two Harbors, Minn.	181,669	169,738
Total	2,472,158	1,936,158

By ranges the shipments have been as follows: Marquette range, 1,024,444 tons; Menominee range, 652,256 tons; Gogebic range, 603,599 tons; Vermilion range, 191,861 tons.

Among the corporations recently granted licenses under the laws of Illinois are the following: Central Manufacturing and Trading Company, Chicago, capital, \$10,000, to manufacture specialties in iron; incorporators, John I. Carr, Chas. H. Beckwith and Chas. I. Beckwith; The Hardy & Faulkner Engine Co., Chicago, capital, \$600,000, to manufacture steam, gas and water engines, pumps, boilers, &c.; incorporators, Franklin D. Lewis, W. and John J. Hardy; The Westernman Iron Company, Peoria, capital, \$50,000, for the manufacture of iron; incorporators, George Westernman, E. H. Keith and E. A. Van Sant; the American Horse Nail Company, capital, \$100,000, to manufacture horseshoe nails; incorporators, James K. Barry, F. A. Butler and Charles P. Monahan.

The Berlin Iron Bridge Company, East Berlin, Conn., are building more bridges this year than ever before in the history of the company. They have now in the works three single track bridges for the Naugatuck division of the New York, New Haven and Hartford Railroad, and seven four-track bridges for the New York division, which are parts of the four track work which the Consolidated road is pushing. They have also the contract for all the bridges on the Meriden and Waterbury road, some 36 in number; also four spans of single track for the Housatonic road. They have nearly half a mile of arcade to build for the Consolidated road to cover the new stations on the New York division. In highway bridges they have contracts on hand for 82 spans, of varying length, from 22 feet to 240 feet. They shipped this week the ironwork for a bridge at Fairfield, Me., 240 feet long, and also 12 other smaller bridges. Some of the larger bridges are—a 240-foot span at Massena, N. Y.; a 220-foot span at Milford, Vt., and a 220 foot span at Highgate, Vt. They have just completed an iron roof at Ansonia, Conn., which required 22 cars for its transportation. In iron buildings they are also doing a heavy business, having two iron buildings to put up for the Seymour Copper Company, at Sayon; one for the Waterbury Brass Company, Waterbury; one for the Stanley Rule and Level Company, New Britain, and another for the City Water-Works, at Burlington, Vt. Only last week they shipped a carload of iron shutters to Idaho, and their iron bridges are to be found as far south and west as Texas.

In Plainfield, N. J., which has a population of 14,000 inhabitants, there have been 100 fires in two years. At last, through a detective who joined the volunteer force of the fire department, evidence was obtained leading to the arrest of seven men, ex members of the department, at least one of whom has made a confession of guilt, the accusation being that buildings were intentionally fired, with the object of demonstrating the necessity for a night watch, in which the alleged incendiaries expected to get lucrative positions.

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PUBLISHER AND BOOKSELLER,

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Exports.

The following table presents the exports of Hardware, Iron, Steel, Metals, &c., from the port of New York, for the week ending August 30, 1887:

Quam.	Val.	Quam.	Val.
Argentina Republic		Sew. ma., cs.	25 1,000
Ag. imp., pkgs.	221 30,555	Firearms, case	1 20
Mach'y, pkgs.	4 176	Mach'y, pkgs.	1 66
Hdw., cs.	141 2,445	Tinware, case	1 20
Cutlery, cs.	17 225	Cartridges, case	1 2
Nails, pkgs.	45 625	French West Indies.	
Mf. iron, pkgs.	51 688	Mf. iron, pkgs.	8 33
Water-closets.	2 51		
		French Guiana.	
Africa.		Sew. ma., cs.	1 15
Firearms, cs.	4 281		
		Glasgow.	
Amsterdam.		Mf. iron, pkgs.	15 300
Hdw., cs.	5 417	Mach'y, pkgs.	4 669
Ag. imp., pkgs.	1 18	Steel sheets,	
Mach'y, pkgs.	2 125	pkgs.	6 110
		Sew. mach., case	4 836
Antwerp.		White metal,	
Sew. ma., cs.	250 8,510	pkgs.	6 150
Hdw., cs.	34 1,050	W. wheels.	2 300
		Hong Kong.	
British Guiana.		Cartridges, cs.	3 270
Steel springs,		Locks, cases.	289 4,298
box.	1 28	Revolvers, case	1 70
Mach'y, pkgs.	1 25	Hdw., cs.	29 682
Mf. iron, pkgs.	2 33	Iron tanks.	10 200
Ag. imp., pkgs.	1 7		
		Hull.	
British East Indies.		Cotton gin, cs.	4 640
Firearms, case.	10 1,685	Mach'y, pkgs.	1 105
Cartridges, cs.	1 20	Hdw., cs.	64 955
Clocks, pkgs.	205 3,916	Wringers, cs.	40 590
Sew. ma., cs.	23 475		
		Haiti.	
Bradford.		Nails, pkgs.	54 203
Mf. iron, pkgs.	4 220	Mf. iron, pkgs.	1 112
		Tinware, case.	1 128
British Australia.		Chains and a.	
Hdw., pkgs.	742 15,920	Hdw., pkgs.	30 332
Mach'y, pkgs.	202 15,302	Mf. iron, pkgs.	3 5
Nails, cs.	91 457	Sew. ma., cs.	6 66
Sew. ma., cs.	91 1,784	Iron, pkgs.	75 119
Tacks, cs.	22 183	Clocks, case.	1 5
Tinware, case.	8 80	Cutlery, case.	1 17
Ag. imp., pkgs.	140 2,749		
Wash. ma., cs.	2 19	Hamburg.	
Clocks, pkgs.	90 2,815	Ag. imp., pkgs.	5 900
Pumps, pkgs.	27 1,679	Hdw., cs.	2 152
Firearms, cs.	10 913	Pumps, pkgs.	3 195
Mf. iron, pkgs.	155 2,554		
Granite ware,		Havre.	
cs.	9 99	Tin plate, bxs.	75 750
Cutlery, cs.	189 1,773	Mf. iron, pkgs.	27 401
Wringers, case.	18 298	Empty shell,	
Cartridges, cs.	19 394	case.	1 10
Bullets, case.	1 26	Fire gauge.	1 73
Steel building		Ag. imp., pkgs.	7 477
mat's pkgs.	211 19,770	Sew. ma., cs.	50 1,487
		Hdw., cs.	4 900
British West Indies.		Firearms, case	1 32
Sew. ma., cs.	18 331	Copper casks.	130 14,025
Ag. imp., pkgs.	1 35	Chains and a.	1 225
Hdw., cs.	49 639	Sew. ma., cs.	33 960
Nails, pkgs.	89 347		
Mf. iron, pkgs.	42 133	Japan.	
Tinware, case.	1 6	Clocks, pkgs.	685 12,899
Pumps, pkgs.	1 21	Mach'y, pkgs.	8 128
Nails, cs.	10 60	Hdw., cases.	87 1,318
Mach'y, pkgs.	1 15	Mf. iron, pkgs.	110 1,122
Cutlery, case.	2 23	Cutlery, case.	1 52
		Sew. ma., cs.	20 506
British Possessions			
in Africa.		Lyons.	
Wash. ma., cs.	2 80	Mf. iron, pkgs.	18 263
Hdw., pkgs.	119 1,511	Leghorn.	
Ag. imp., pkgs.	549 8,650	Revolvers, case.	4 1,005
Mf. iron, pkgs.	57 634		
Pumps, pkgs.	3 109	Liverpool.	
Cutlery, cs.	155 1,646	Copper mat.	
Nails, cs.	194 515	sacks.	6842 44,354
Mach'y, pkgs.	6 350	Lead, pgs.	2789 25,101
		Firearms, case	1 84
Bremen.		Ag. imp., pkgs.	54 2,461
Mf. iron, pkgs.	1 35	Mach'y, pkgs.	17 1,299
Ag. imp., pkgs.	1 46	Hdw., cs.	1 8
Hdw., cs.	12 169	Sew. ma., cs.	101 1,316
		Clocks, case.	1 18
Brussels.		London.	
Sew. ma., cs.	61 1,760	Ag. imp., pkgs.	79 1,608
Bradford.		Guns, cs.	4 447
Mf. iron, pkgs.	2 100	Mf. iron, pkgs.	9 217
		Iron rails,	
Brazil.		crts.	2 1,000
Hdw., pkgs.	511 6,089	Pumps, pkgs.	3 144
Firearms, cs.	18 1,283	Wrecks.	3 629
Mach'y, pkgs.	3407 55,778	Mach'y, pkgs.	30 2,279
Cotton gins,		Per. caps, c	1 103
cs.	23 1,215	Sew. ma., cs.	157 3,188
Car-wheels.		Clocks, cases.	94 1,660
Tacks.	62 406	Iron drums.	25 219
Tinware, cs.	6 120	Hdw., cs.	103 2,964
Nails, pkgs.	62 171	Ox. zinc, bbls.	100 854
Mf. iron, pkgs.	109 1,903		
Ag. imp., pkgs.	109 1,908	Mexico.	
Cutlery, cs.	113 1,705	Tins, case.	1 10
Cartridges,			
cs.	18 569	Mach'y, pkgs.	4 90
Pl'd ware, cs.	19 3,037	Firearms, case.	4 530
Pumps, pkgs.	22 763	Cartridges, cs.	53 1,019
Clocks, pkgs.	31 606	Sew. ma., cs.	44 638
Sew. ma., cs.	129 1,347	Mf. iron, pkgs.	147 1,473
Iron, pkgs.	39 91	Nails, kgs.	323 720
Agate ware,		Locomotive.	
cases.	12 520	Hdw., cs.	74 1,355
		Iron, pgs.	15 150
China.		Guns, case.	1 225
Clocks, cs.	42 873	Cutlery, cases	181 2,092
Mach'y, pkgs.	8 348	Pumps, pkgs.	5 105
Hdw., cs.	8 446		
Turn table.		Madrid.	
Nails, case.	1 6	Pumps, pkgs.	9 745
Sew. ma., cs.	72 942	Cider mill.	1 25
Mf. iron, pkgs.	573 4,161	Milan.	
Firearms, case.	1 47	Mach'y, pkgs.	5 703
I. bridge.	1 5,580	Odessa.	
		Ag. imp., pkgs.	4 170
Christiania.			
Hdw., cs.	60 822	Hdw., cs.	3 76
Mach'y, pkgs.	5 900		
		Porto Rico.	
Chile.		Brass g'ds, cs.	2 63
Ag. imp., pkgs.	36 1,540	Nails, kgs.	41 111
		Tinware, case	1 9
Cuba.		Hdw., pkgs.	30 189
Mf. iron, pkgs.	369 2,475	Iron, pkgs.	27 141
Mach'y, pkgs.	104 8,755	Boiler tubes.	50 67
Clocks, pkgs.	36 520		
Wire cloth, cs.	2 61	Hdw., cs.	4 66
Tacks, cs.	4 95	Cartridges, cs.	11 338
Tinware, case.	2 8	Ag. imp., pkgs.	2 62
Sew. ma., case.	1 14	New York Metal Exchange.	
Hdw., pkgs.	37 114	Philadelphia.	
Cutlery, cs.	16 287	Pittsburgh.	
Ag. imp., pkgs.	12 910	Cincinnati.	
Tin, bars, case.	1 101	Chicago.	
Nails, kgs.	381 835	Cleveland.	
Pumps, pkgs.	1 21	St. Louis.	
		Chattanooga.	
Central America.		Louisville.	
Mf. iron, pkgs.	269 871	General Hardware.	
Steel, pkgs.	2 43	Detroit.	
Mach'y, pkgs.	80 1,957	Birmingham.	
Iron, bbls.	15 140	Imports.	
Sew. ma., cs.	79 2,050	Durability of Storage Batteries.	
Nails, kgs.	36 130	Current Hardware Prices.	
Zinc, casks.	4 79	Manufacturing:	
Clocks, cs.	4 158	Iron and Steel.	
Lead, box	1 11	Machinery.	
Cutlery, cs.	5 132	Hardware.	
Cartridges, cs.	9 167	Miscellaneous.	
Hdw., cs.	36 123	Exports:	
Quick silver,		Coal Market.	
flasks.	102 3,945	Tests of Aluminium Alloys.	
Ag. imp., pkgs.	8 108	The Chemical Composition of Natural Gas.	
Yellow metal,		A Device for Balancing Lock	
Nails, cs.	18 114	Stencils that are hav-	
Solder, box.	1 13	ing such a run.	
Revolvers, cs.	2 132		
Ux shoes, lks.	27 329		
Dublin.			
Hdw., cs.	10 60		
Danish West Indies.			
Nails, kgs.	11 32		
Dutch East Indies.			
Cartridges, cs.	11 252		
Bullets, case.	1 12		
Firearms, case.	1 20		
Ecuador.			
Hdw., cs.	25 499		
Clocks, cs.	6 142		
Mf. iron, pkgs.	25 161		

Quam.	Val.	Quam.	Val.
Lead pipe, cs.	1 31	Uruguay.	
Brass, gds, cs.	3 113	Hdw., pkgs.	52 150
Per. caps, cs.	1 40	Tacks, cs.	11 71
Quick silver,		Cutlery, cs.	2 90
flask.	1 40	Car wheels.	100 675
Hdw., pkgs.	129 3,593	Sew. ma., case	1 30
Cutlery, cs.	4 885	Ag. imp., pkgs.	209 3,284
Iron, pkgs.	392 781	W. mills.	1 1,000
Firearms, cs.	1 257		
Shot, bags.	24 193	Venezuela.	
Wash mach.	1 20	Mach'y, pkgs.	1 15
Nails, kgs.	30 67	Tinware, case.	1 50
Steel caps,			
pkgs.	225 3,692	Mach'y, pkgs.	2 100

Exports of Metals from August 22 to August 25, inclusive.

Copper: American Metal Co.	217 042
Philips Bros.	35 5
Copper Matte: T. P. Kennedy	210 260
Williams & Terhune	612 390
Lead: Perry & Ryer.	224 000

Coal Market.

The decisive event of the week was the decision of the Anthracite Coal trade managers, at a meeting held in this city on Tuesday, not to advance the September prices. At another meeting to be held September 15, the subject will be further considered, as views just now are somewhat divergent. Meanwhile it is not improbable that prices, which have been sagging off, will be stiffened, and the presumption is that if the policy marked out is adhered to the demand will soon become more active. At a meeting of the Anthracite Committee in Philadelphia the amount of production for September was fixed at 3,250,000 tons. A Wilkesbarre dispatch says there is an entire suspension of Coal shipments this week over the Lehigh Valley Railroad, which was 500 tons ahead of its allotment. More inquiry for Coal for future delivery is reported, particularly from the East, and shipments in that direction are increasing. There is some delay in shipments at Port Richmond in consequence of the scarcity of vessels. Most of the mines are now working full time. Freighters are quoted 95¢ @ \$1.06 and discharge to Boston, and 90¢ and discharge to Providence. Quotations in New York are: Free burning White Ash, broken, \$3.65; Egg, \$3.80; Stove, \$4.25; Chestnut, \$4.10; Pea, \$3. Pittston is a shade under, except Chestnut and Pea, which are \$4.15 and \$3.20, respectively. Reading Hard White Ash, Broken, \$3.85; Egg, \$4; Stove, \$4.25; Chestnut, \$3.85; Pea, \$2.75. The total production of Anthracite for the week was 711,000 tons, against 646,000 tons for the corresponding week last year, and the total since January 1 is 21,491,000 tons, an increase of 2,371,000 tons compared with last year. The Pennsylvania Railroad increased its shipments 1,270,000 tons. Bituminous Coal is shaded in price, report says 30¢ 3/4 ton below the circular, and is pushing the Anthracite Pea as a steam producer.

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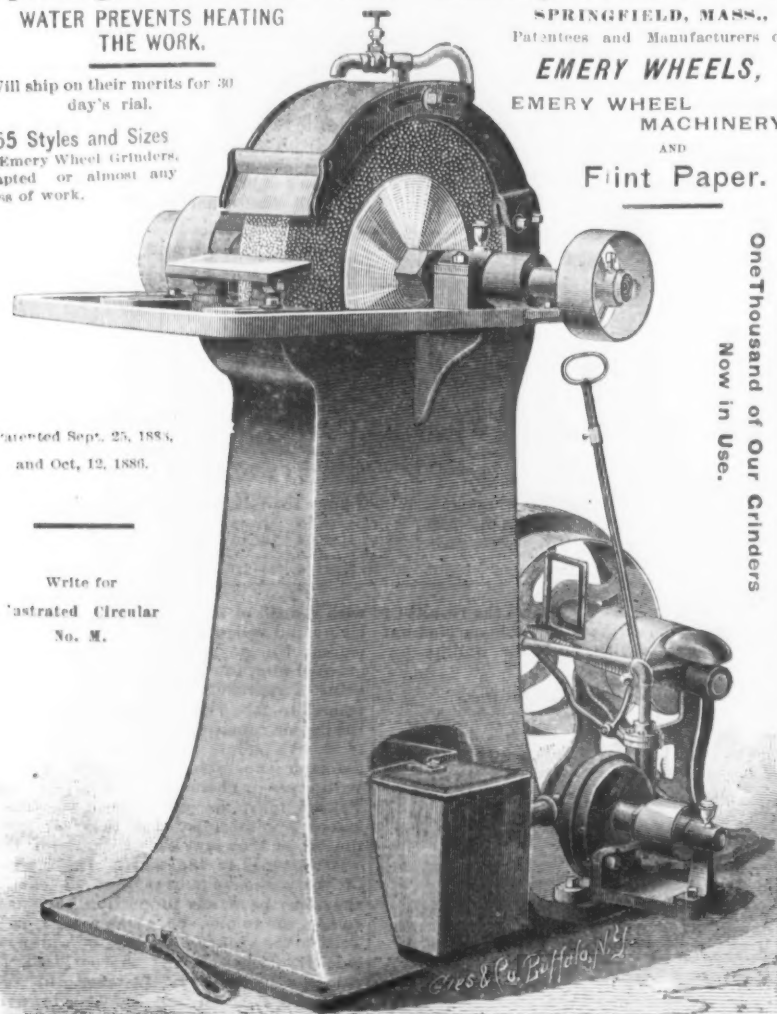
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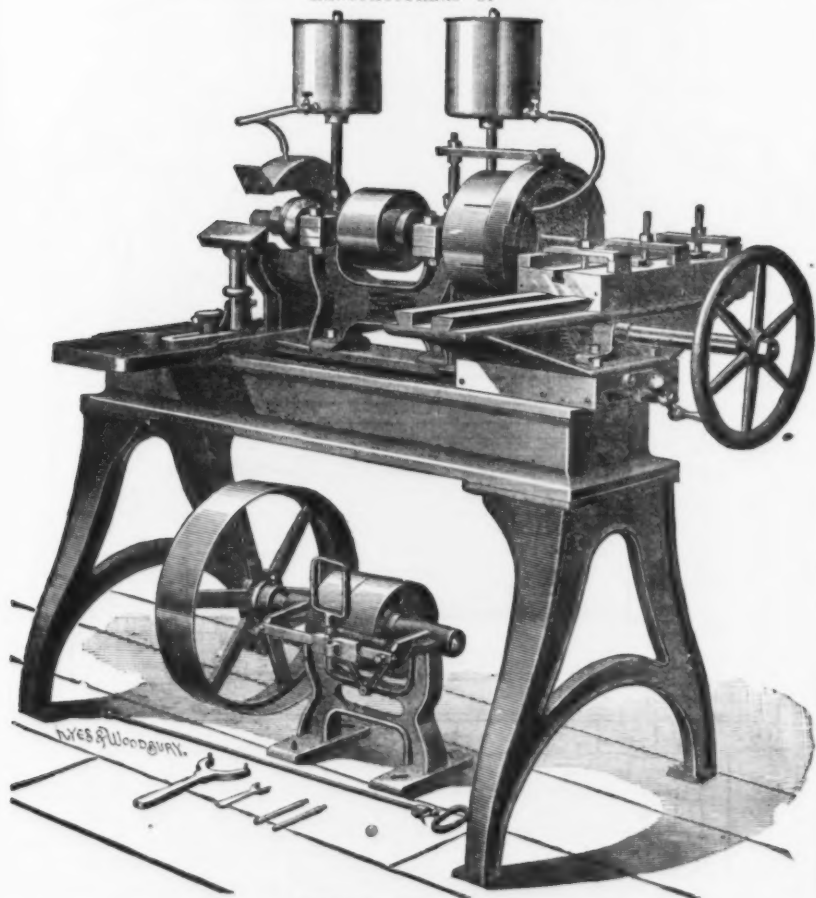




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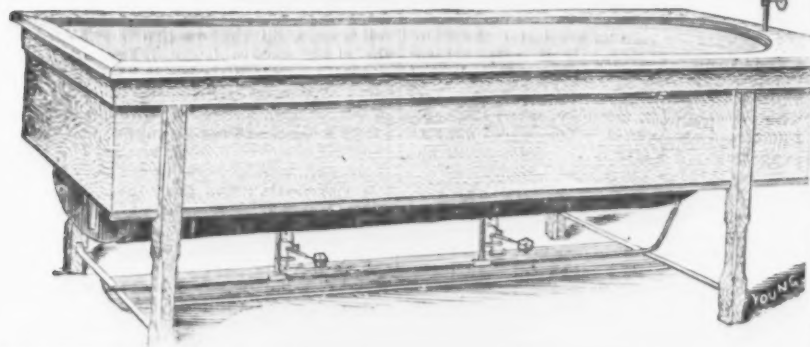
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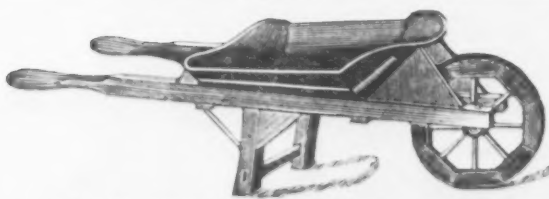
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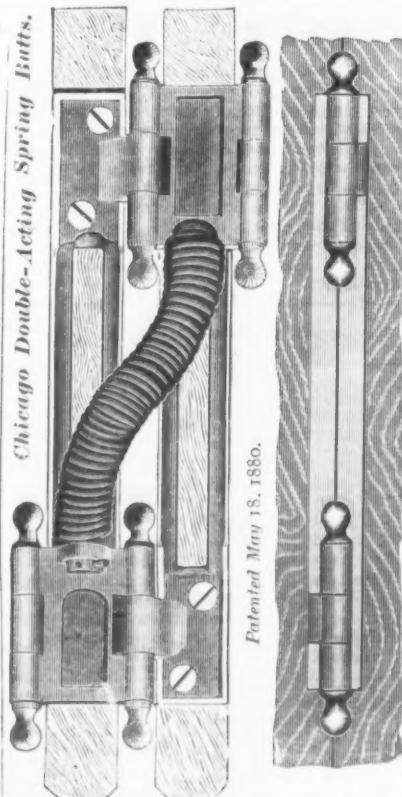
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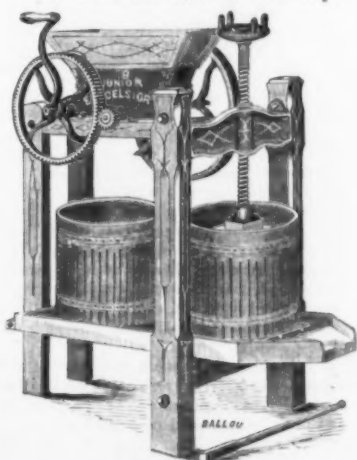
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Pair.	\$2.75	\$3.00	\$3.25	\$3.50	\$3.75
Pair.	\$3.00	\$3.25	\$3.50	\$3.75	\$4.00
Pair.	\$3.25	\$3.50	\$3.75	\$4.00	\$4.25
Pair.	\$3.50	\$3.75	\$4.00	\$4.25	\$4.50
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Pair.	\$4.25	\$4.50	\$4.75	\$5.00	\$5.25
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Pair.	\$5.25	\$5.50	\$5.75	\$6.00	\$6.25
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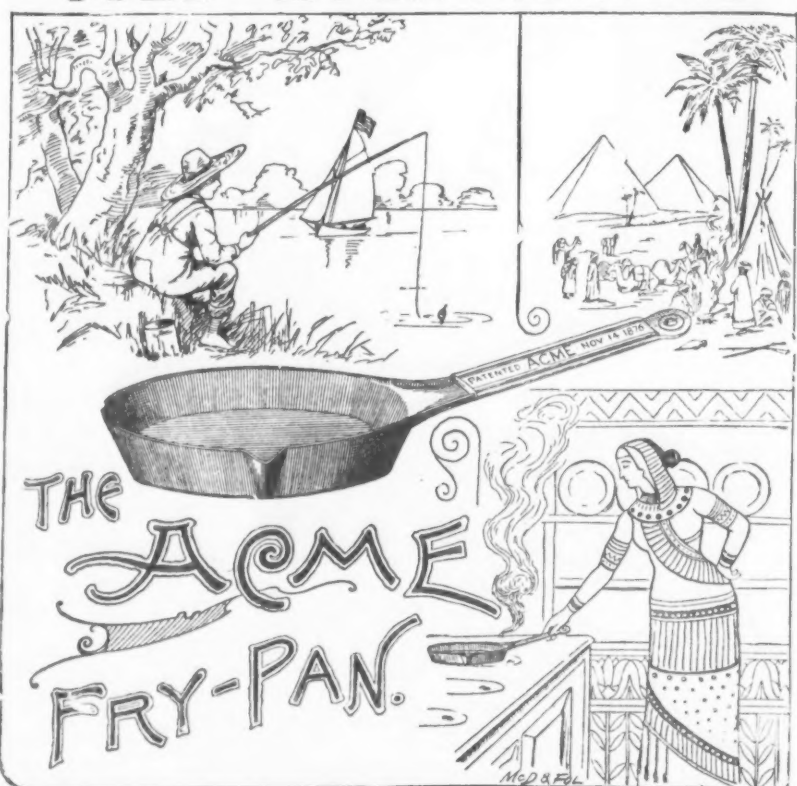
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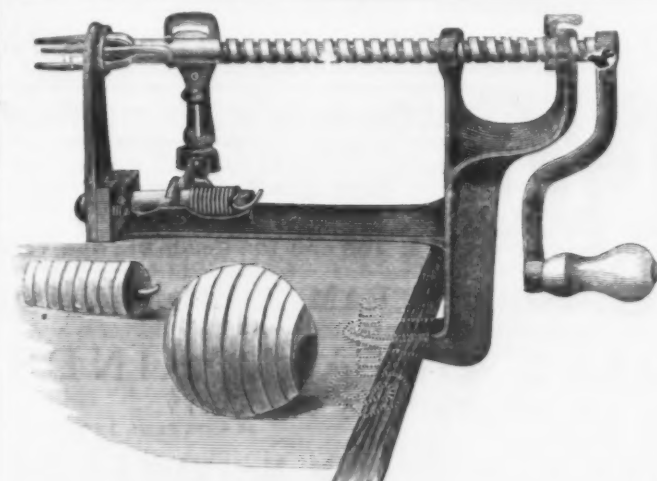
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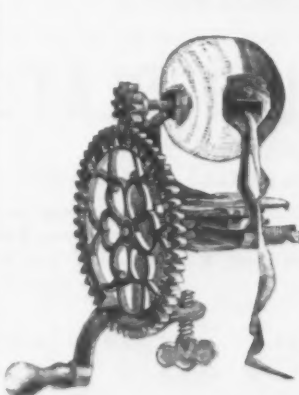
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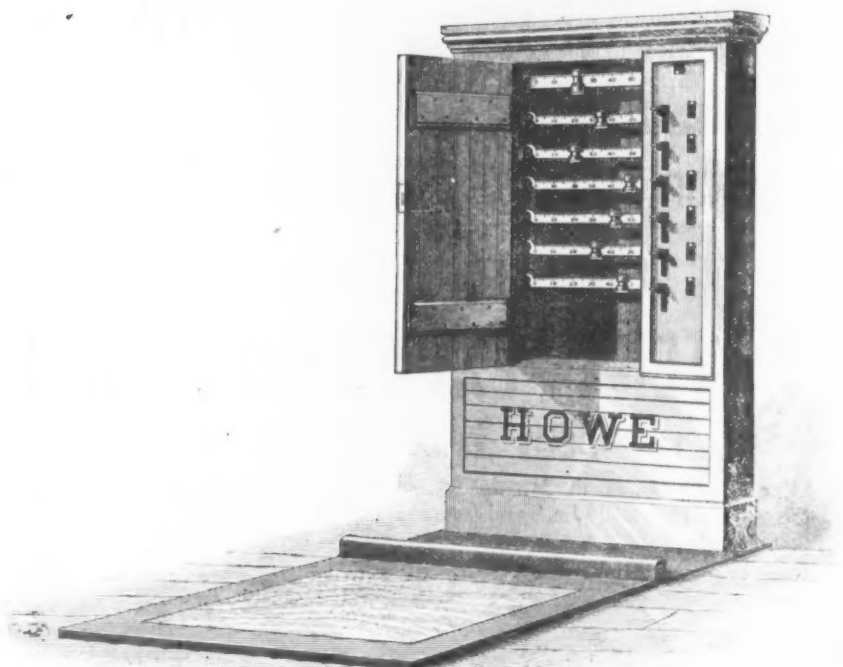
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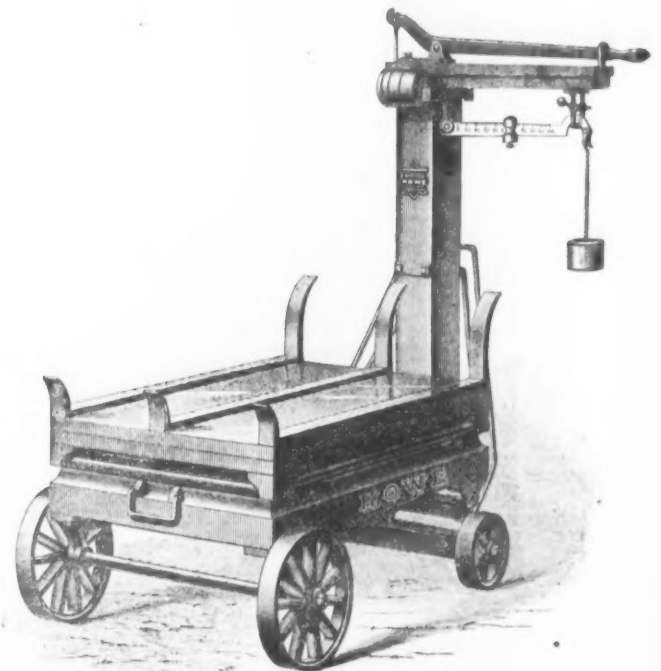
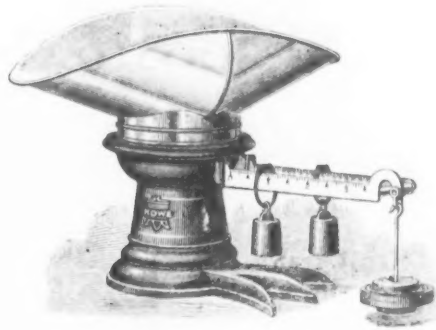
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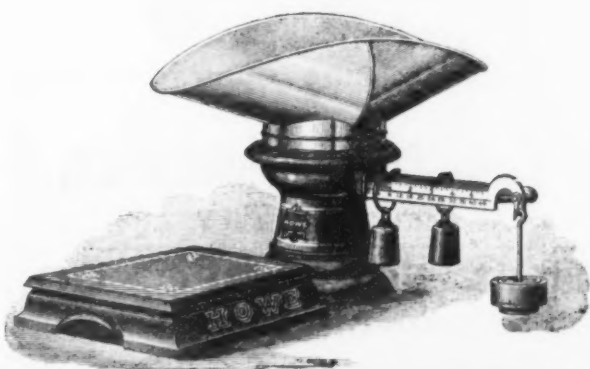
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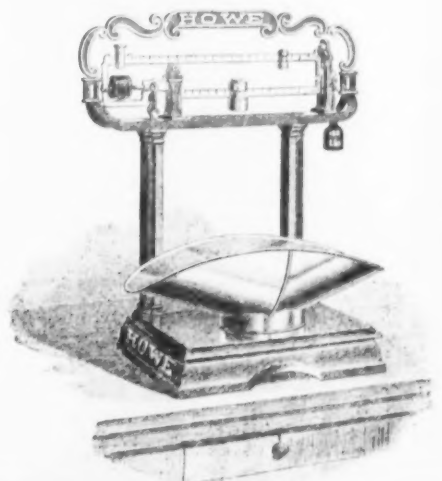
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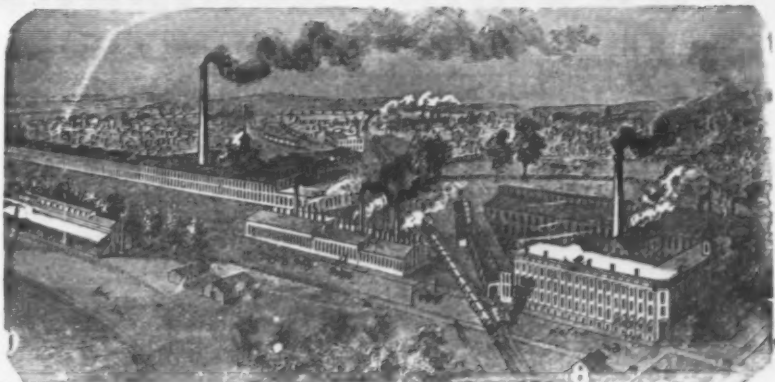
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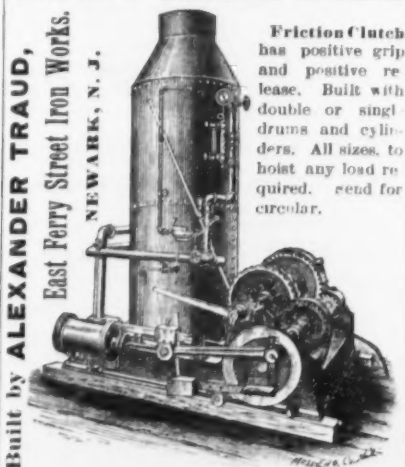
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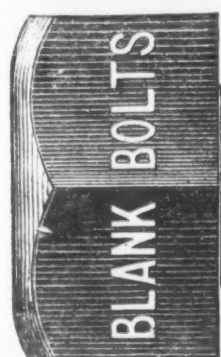
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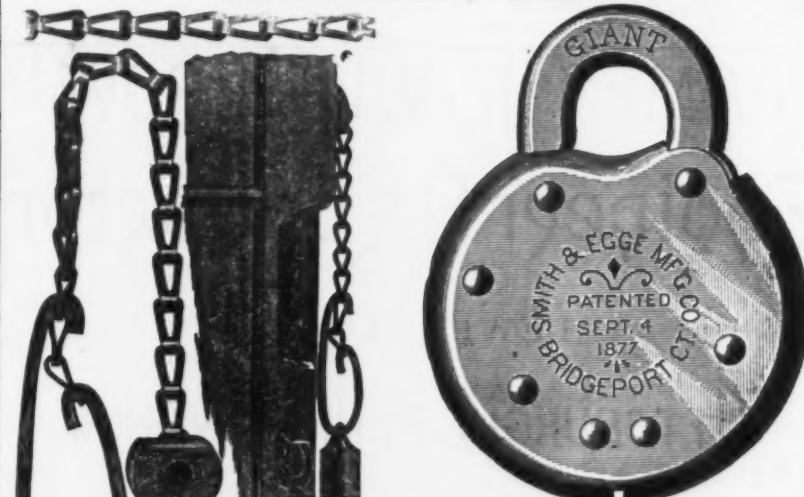
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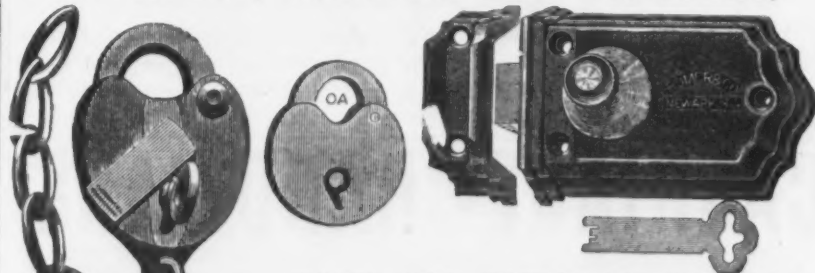
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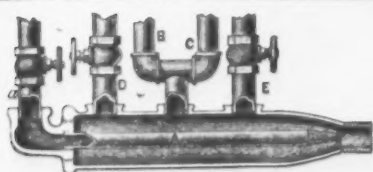
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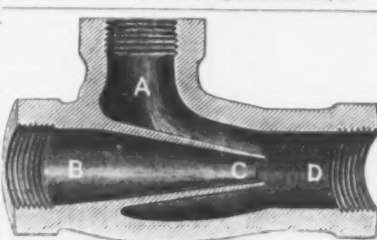
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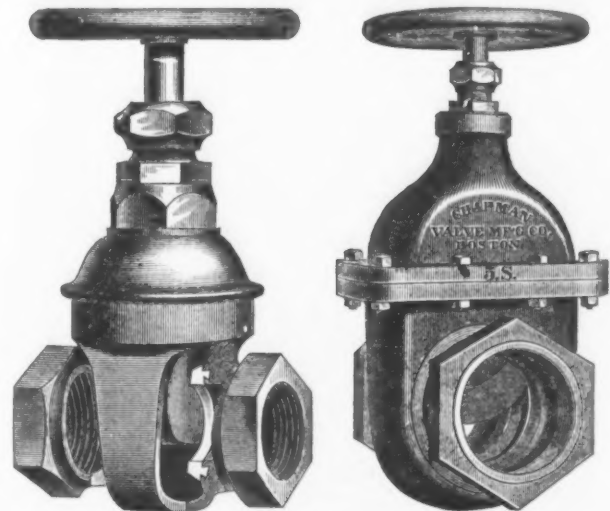
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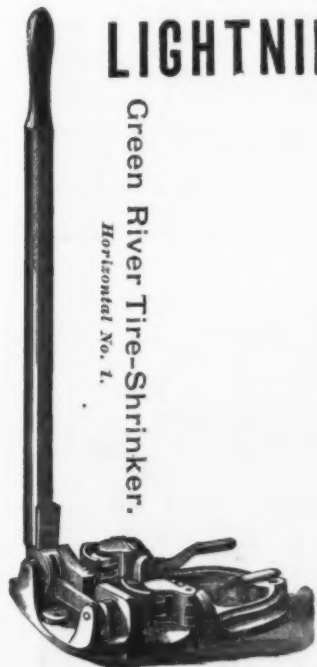
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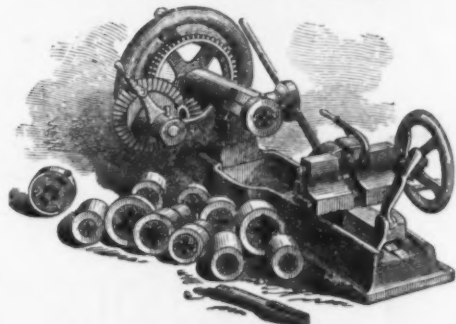
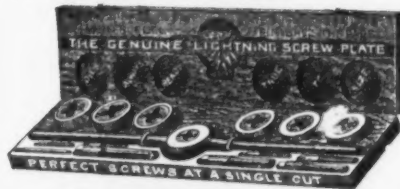
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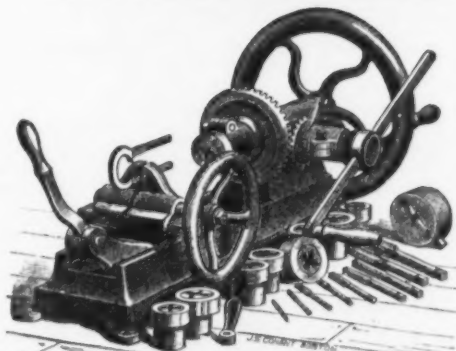
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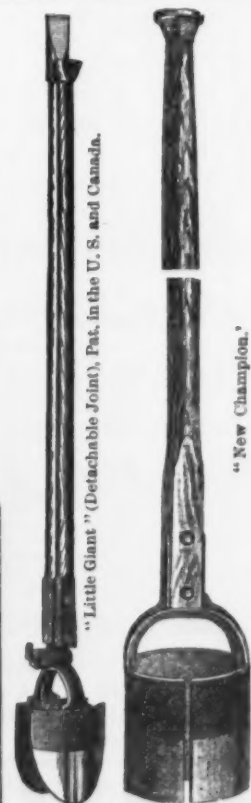
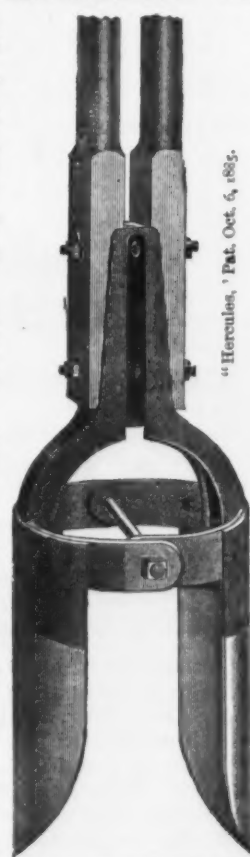
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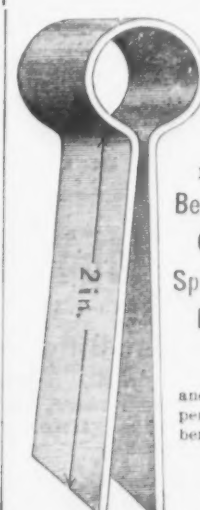


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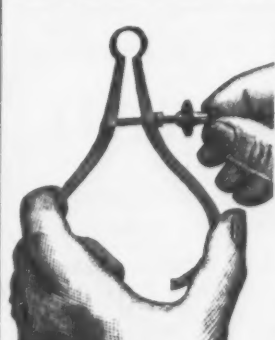
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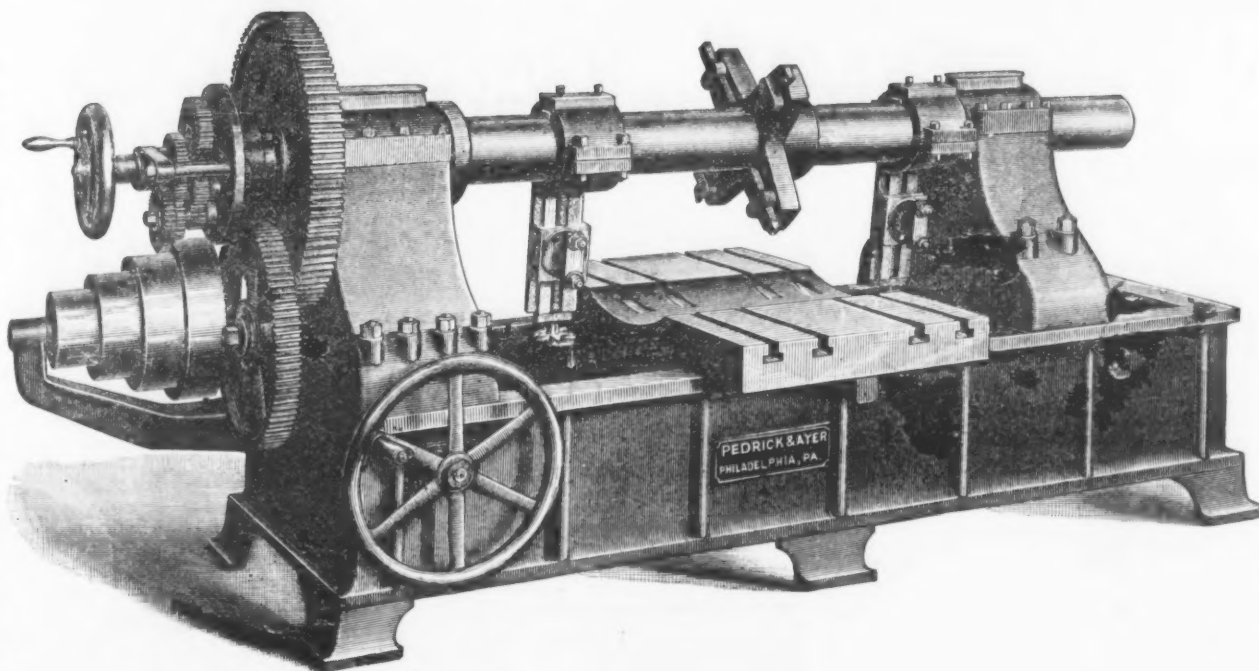
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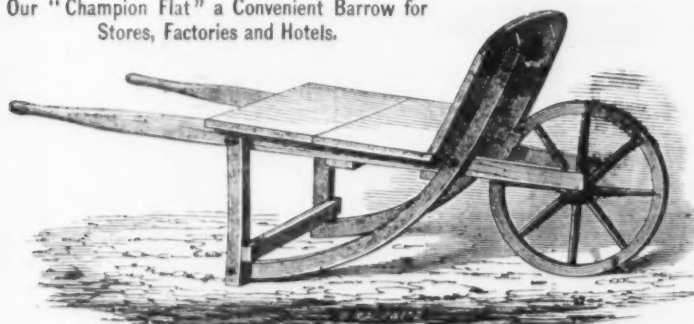
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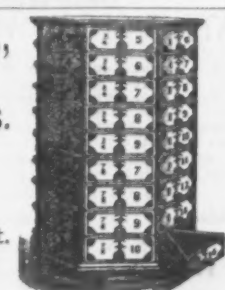
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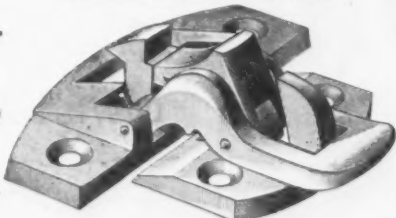
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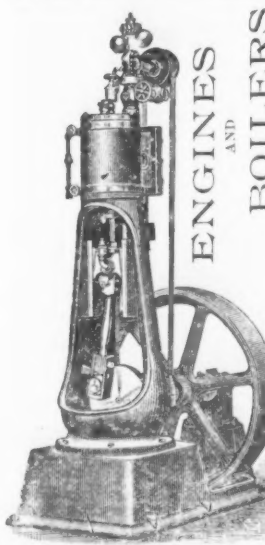
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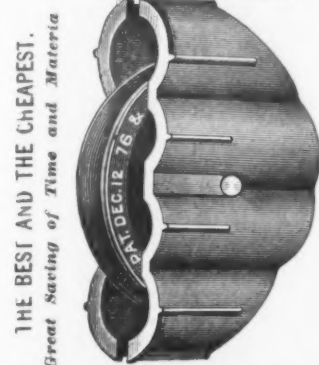






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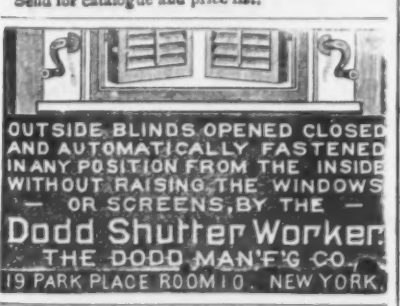
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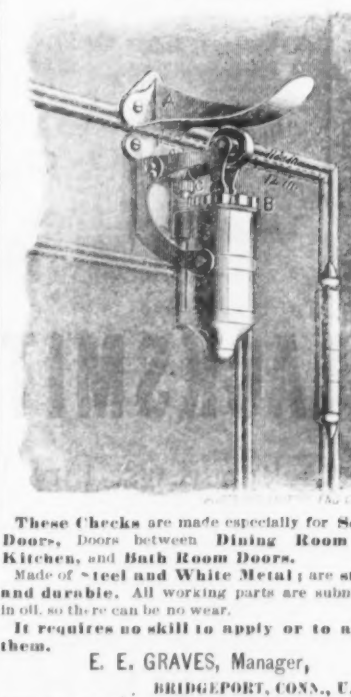


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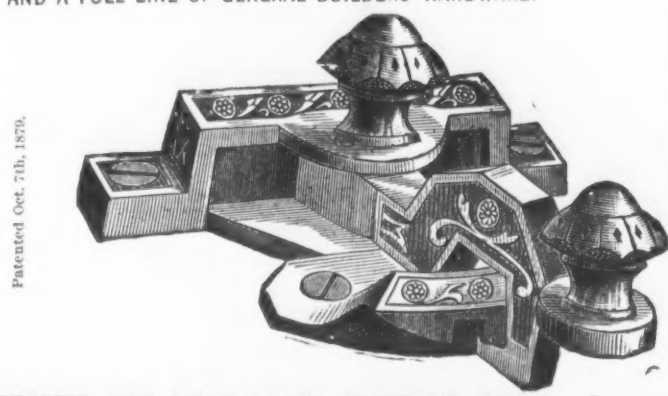
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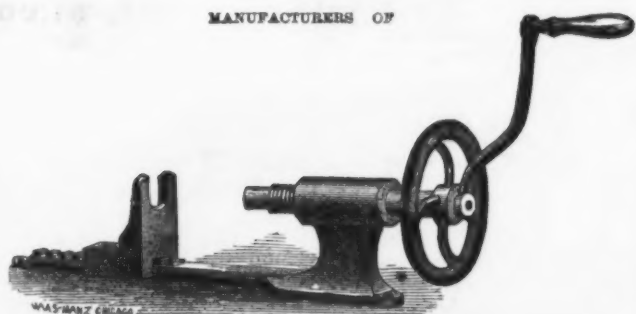
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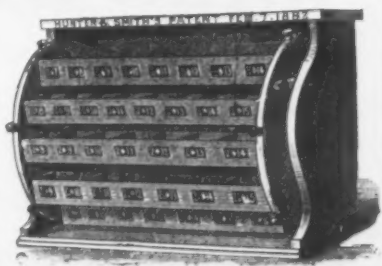
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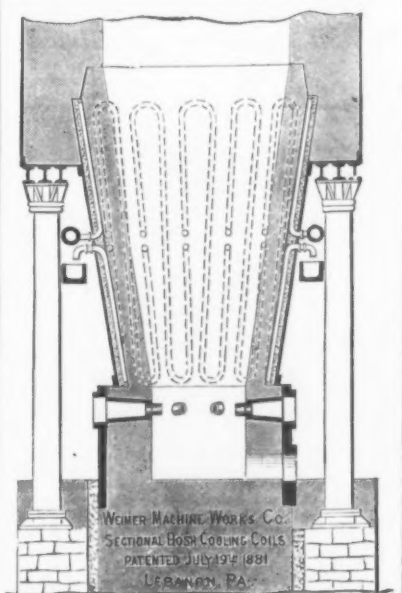
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2.00.58.44	2.03.50.60	2.04.42.86	2.05.35.06	2.06.42.27	2.07.53.48	2.09.09.69	2.10.29.89	2.11.53.11	2.13.22.47
3.00.87.66	3.03.79.87	3.04.72.08	3.05.64.28	3.06.71.49	3.07.82.70	3.09.08.91	3.10.29.11	3.11.53.31	3.13.22.47
4.01.16.88	4.04.09.09	4.05.01.30	4.05.93.51	4.06.10.71	4.07.21.92	4.08.38.13	4.09.58.33	4.11.22.53	4.12.58.73
5.01.46.10	5.04.38.31	5.05.30.52	5.06.22.73	5.07.34.94	5.08.46.15	5.09.62.36	5.10.82.56	5.12.07.77	5.13.27.97
6.01.75.32	6.04.67.53	6.05.59.74	6.06.51.95	6.07.63.16	6.08.74.37	6.10.00.58	6.11.20.78	6.12.45.99	6.14.06.19
7.02.04.55	7.04.96.76	7.05.88.97	7.06.80.18	7.07.91.39	7.08.10.60	7.09.36.81	7.10.56.01	7.12.31.22	7.13.51.42
8.02.33.77	8.05.25.97	8.06.18.18	8.07.10.39	8.08.21.60	8.09.32.81	8.10.58.02	8.12.18.22	8.13.43.43	8.15.03.63
9.02.62.99	9.05.55.19	9.06.47.40	9.07.39.61	9.08.50.82	9.09.62.03	9.10.88.24	9.12.08.44	9.13.33.65	9.14.53.85
10.02.92.21	10.05.84.41	10.06.76.62	10.07.68.83	10.08.79.04	10.09.90.25	10.11.16.46	10.12.36.66	10.13.61.87	10.14.82.07

60, 10, 10, 7 1/2 & 5.									
1.00.29.22	1.03.31.43	1.04.13.64	1.05.05.84	1.06.11.82	1.07.22.47	1.08.38.61	1.09.58.81	1.11.22.47	1.12.58.81
2.00.58.44	2.03.50.60	2.04.42.86	2.05.35.06	2.06.42.27	2.07.53.48	2.09.09.69	2.10.29.89	2.11.53.11	2.13.22.47
3.00.87.66	3.03.79.87	3.04.72.08	3.05.64.28	3.06.71.49	3.07.82.70	3.09.08.91	3.10.29.11	3.11.53.31	3.13.22.47
4.01.16.88	4.04.09.09	4.05.01.30	4.05.93.51	4.06.10.71	4.07.21.92	4.08.38.13	4.09.58.33	4.11.22.53	4.12.58.73
5.01.46.10	5.04.38.31	5.05.30.52	5.06.22.73	5.07.34.94	5.08.46.15	5.09.62.36	5.10.82.56	5.12.07.77	5.13.27.97
6.01.75.32	6.04.67.53	6.05.59.74	6.06.51.95	6.07.63.16	6.08.74.37	6.10.00.58	6.11.20.78	6.12.45.99	6.14.06.19
7.02.04.55	7.04.96.76	7.05.88.97	7.06.80.18	7.07.91.39	7.08.10.60	7.09.36.81	7.10.56.01	7.12.31.22	7.13.51.42
8.02.33.77	8.05.25.97	8.06.18.18	8.07.10.39	8.08.21.60	8.09.32.81	8.10.58.02	8.12.18.22	8.13.43.43	8.15.03.63
9.02.62.99	9.05.55.19	9.06.47.40	9.07.39.61	9.08.50.82	9.09.62.03	9.10.88.24	9.12.08.44	9.13.33.65	9.14.53.85
10.02.92.21	10.05.84.41	10.06.76.62	10.07.68.83	10.08.79.04	10.09.90.25	10.11.16.46	10.12.36.66	10.13.61.87	10.14.82.07

60, 10, 10, 7 1/2 & 2.									
1.00.29.22	1.03.31.43	1.04.13.64	1.05.05.84	1.06.11.82	1.07.22.47	1.08.38.61	1.09.58.81	1.11.22.47	1.12.58.81
2.00.58.44	2.03.50.60	2.04.42.86	2.05.35.06	2.06.42.27	2.07.53.48	2.09.09.69	2.10.29.89	2.11.53.11	2.13.22.47
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6.01.75.32	6.04.67.53	6.05.59.74	6.06.51.95	6.07.63.16	6.08.74.37	6.10.00.58	6.11.20.78	6.12.45.99	6.14.06.19
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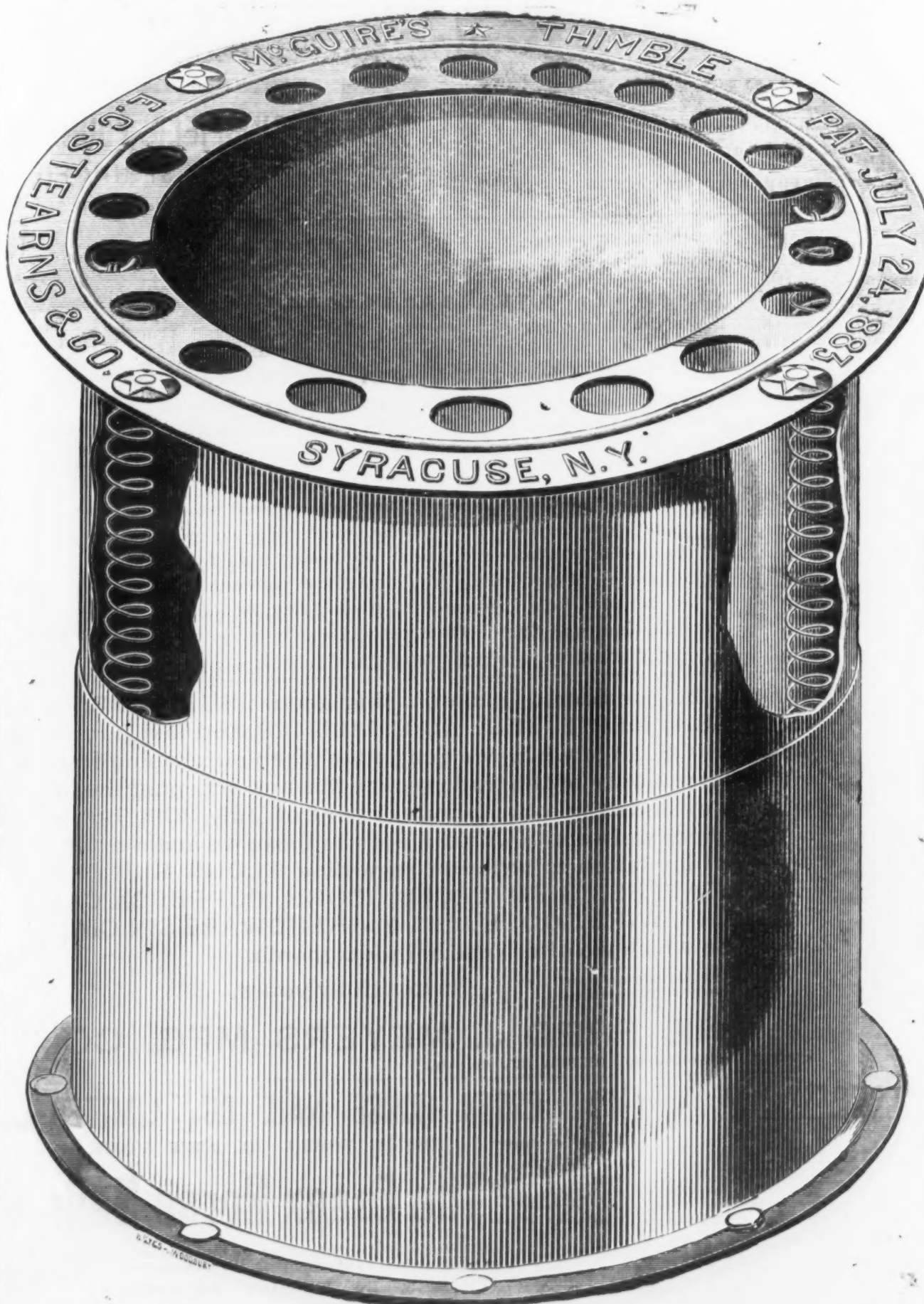
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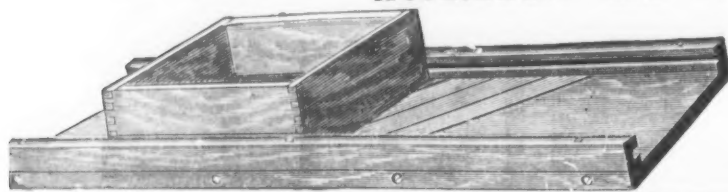


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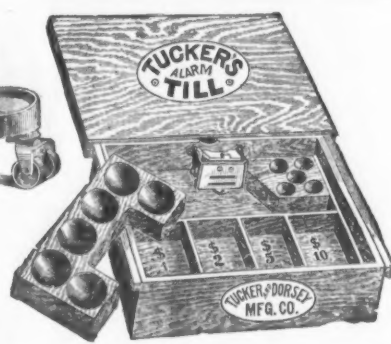
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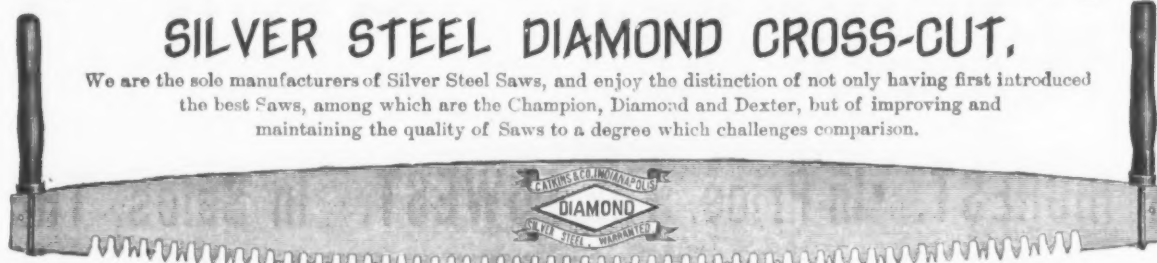
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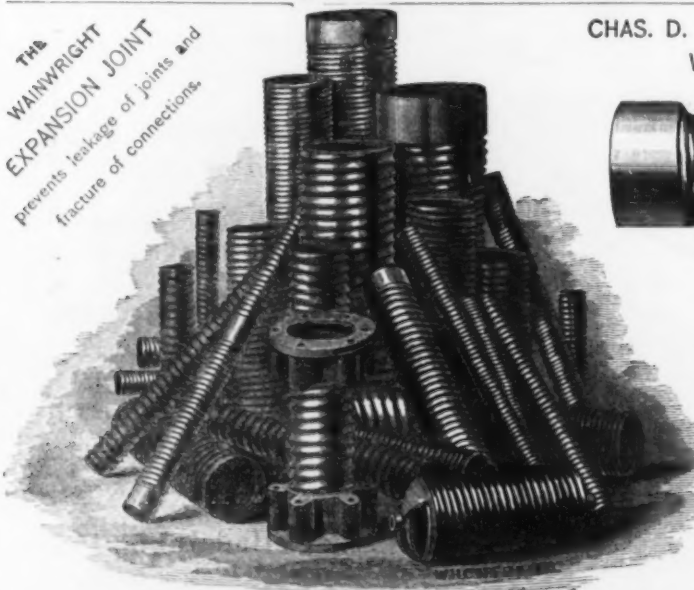
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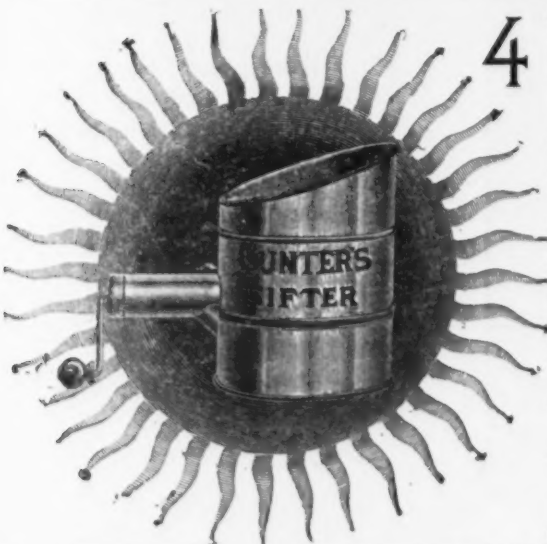
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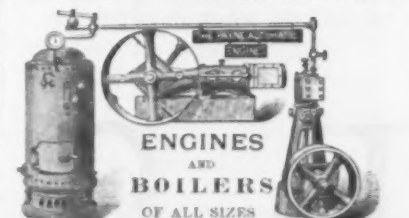
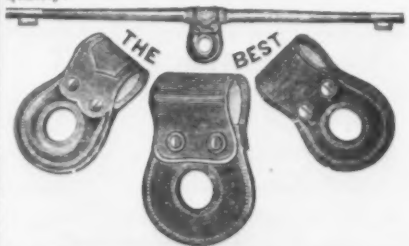
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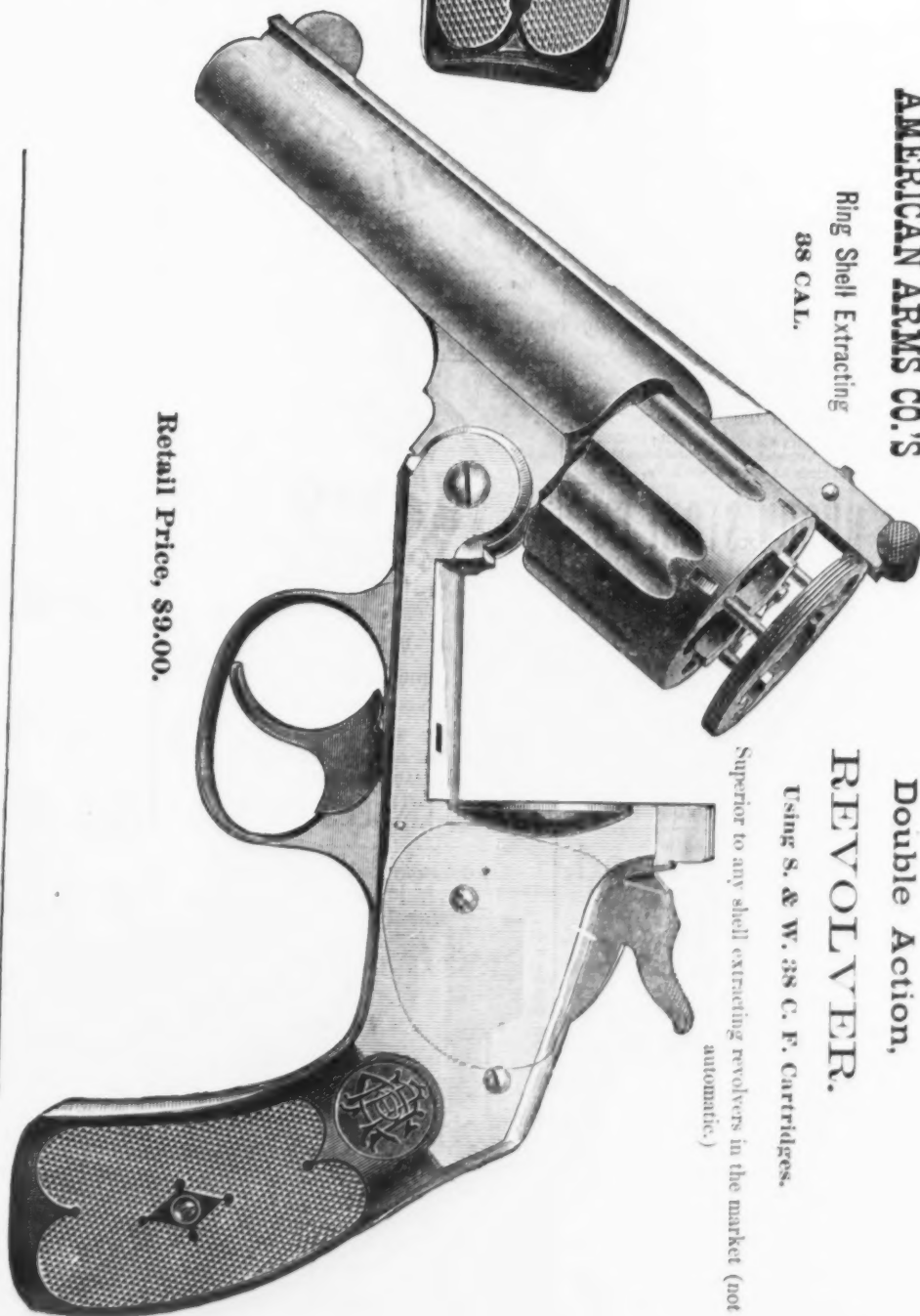
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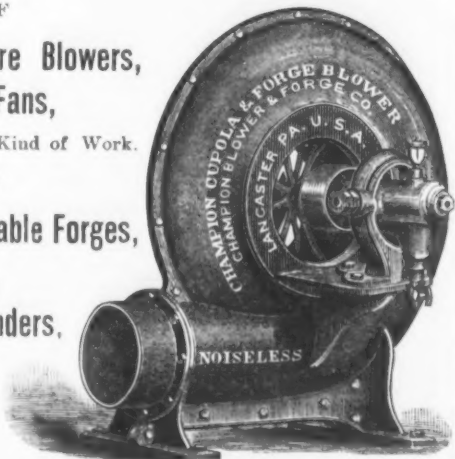
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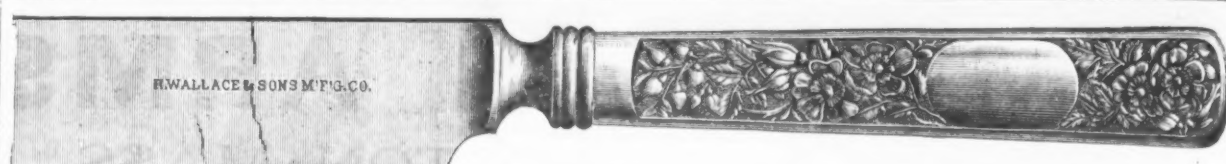
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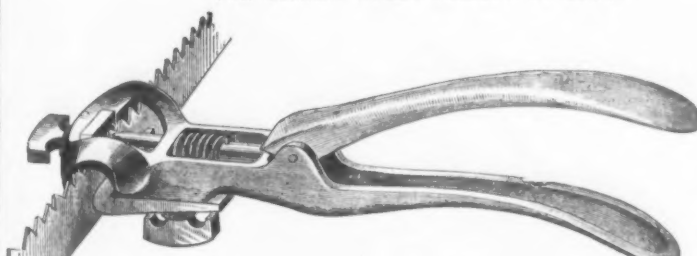
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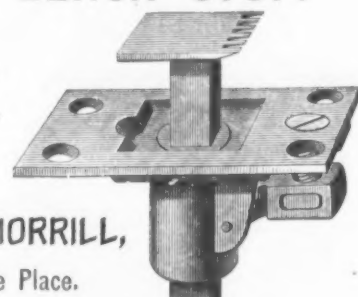
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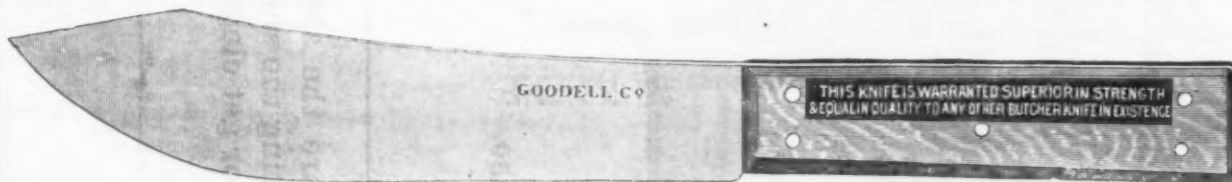
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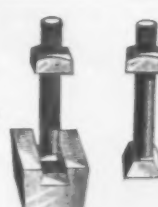
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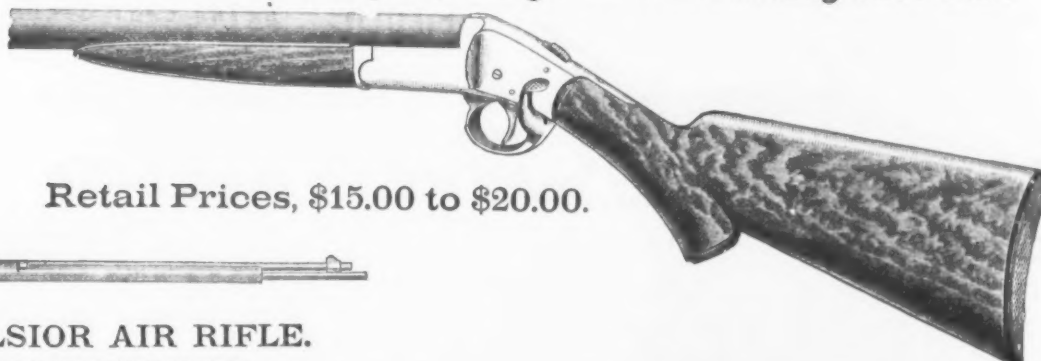


Top Snap "Champion," Single Breech-Loading Shot Gun.

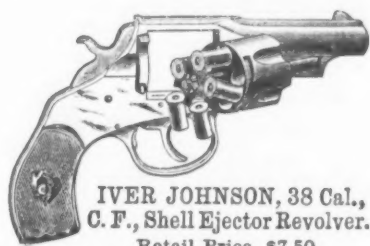


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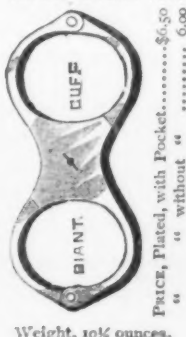


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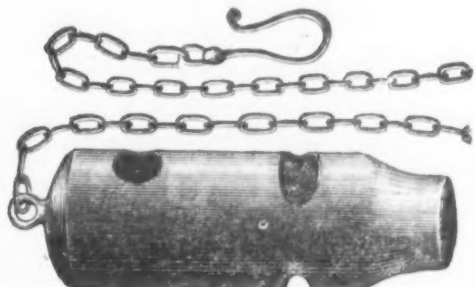
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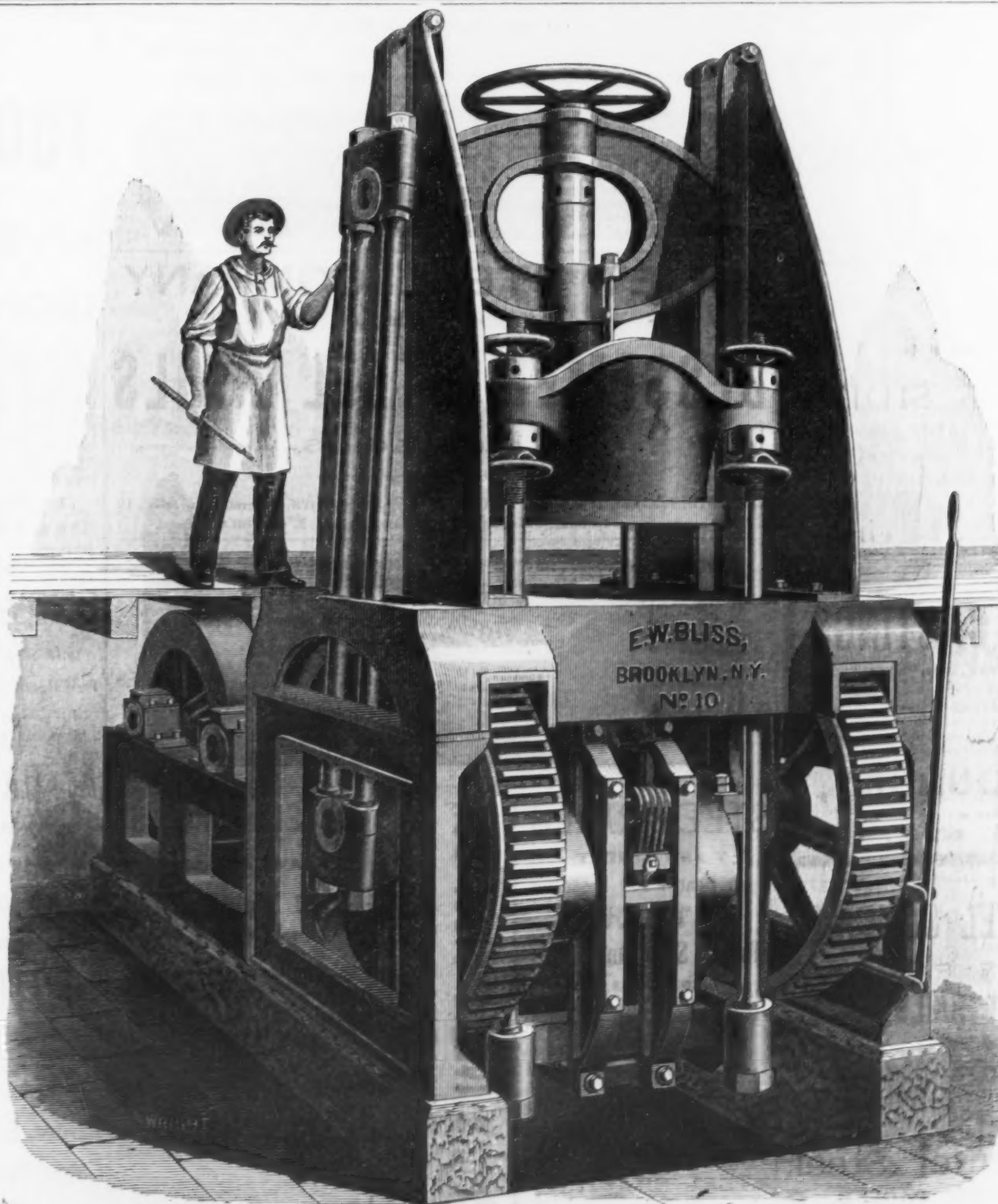
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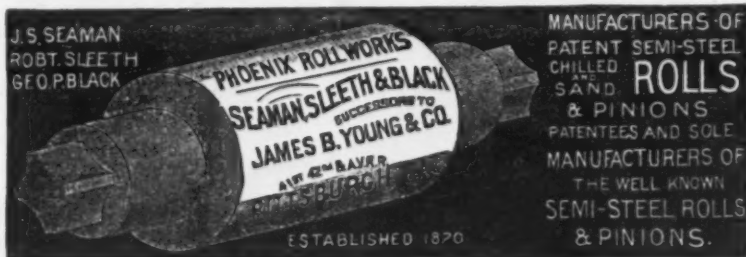
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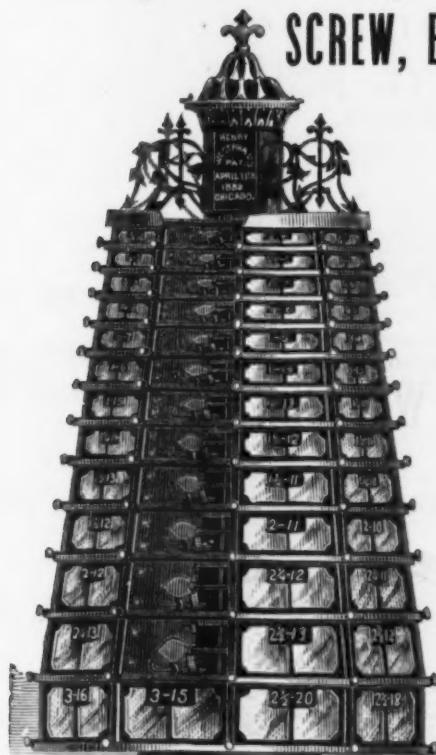
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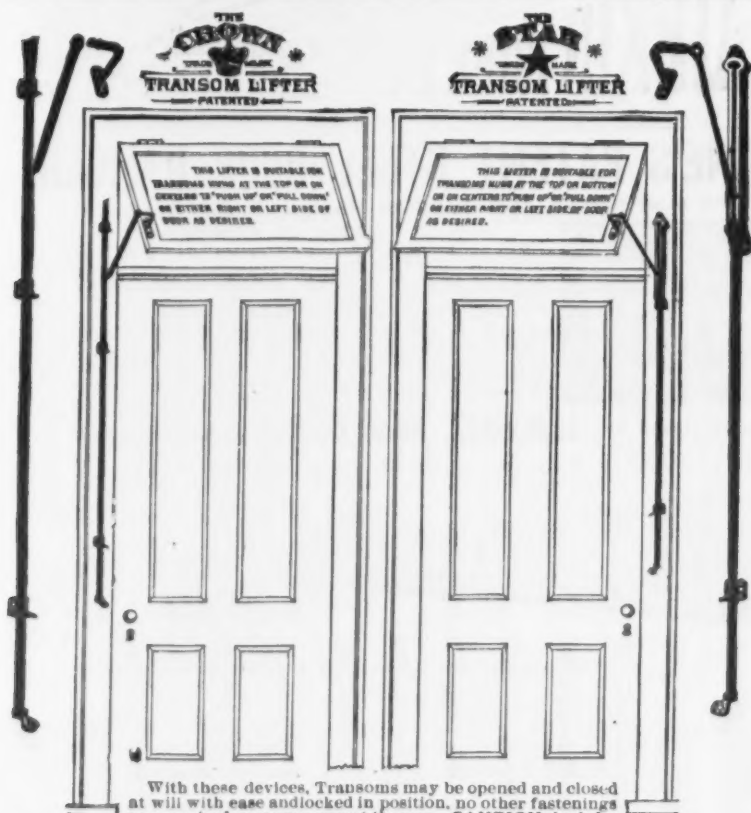
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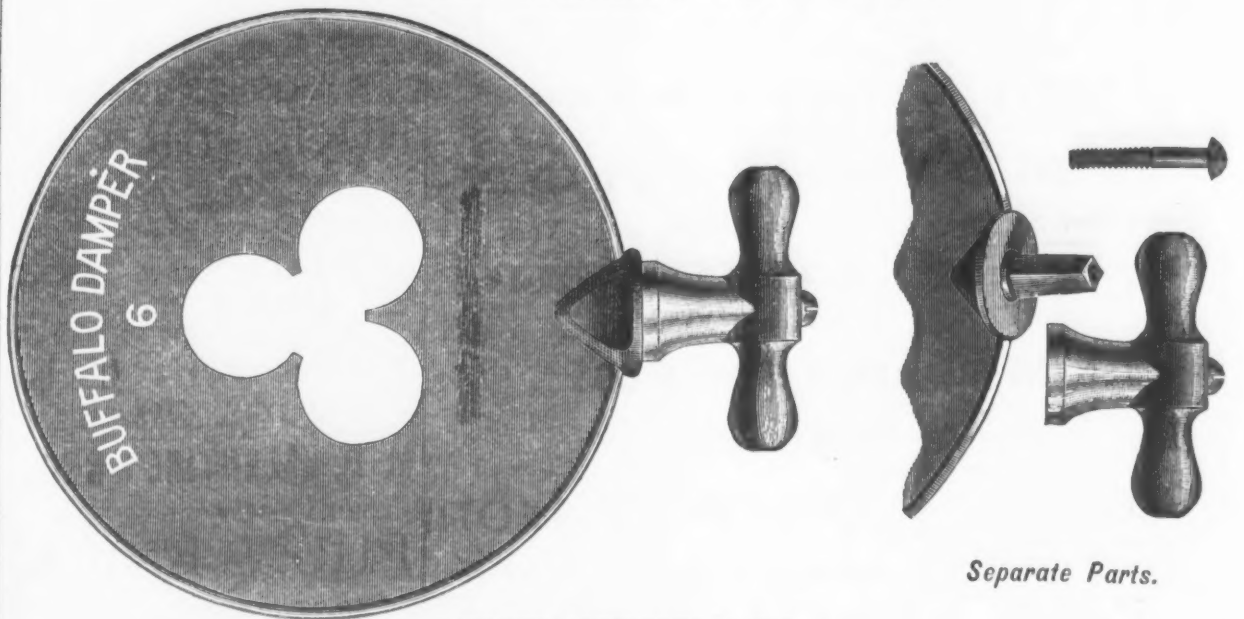
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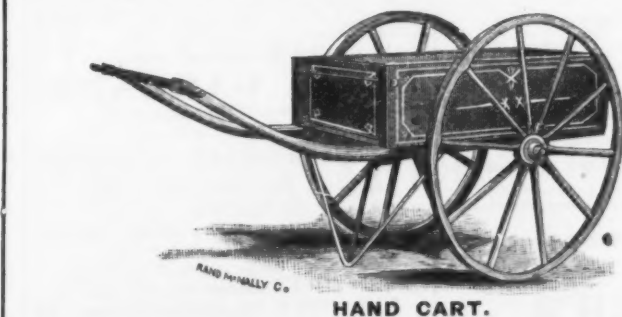
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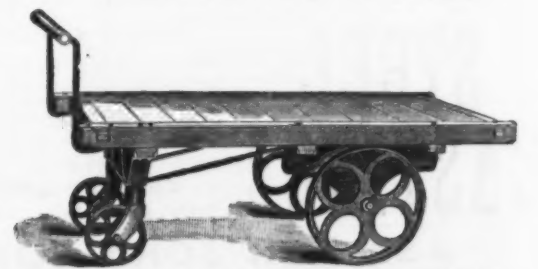
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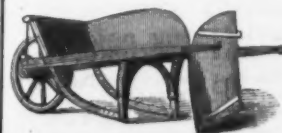


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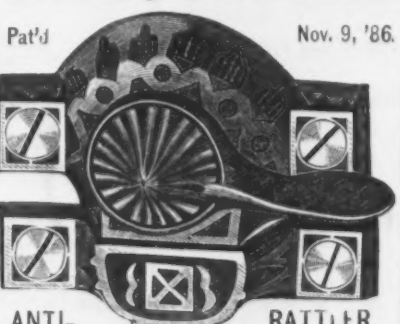
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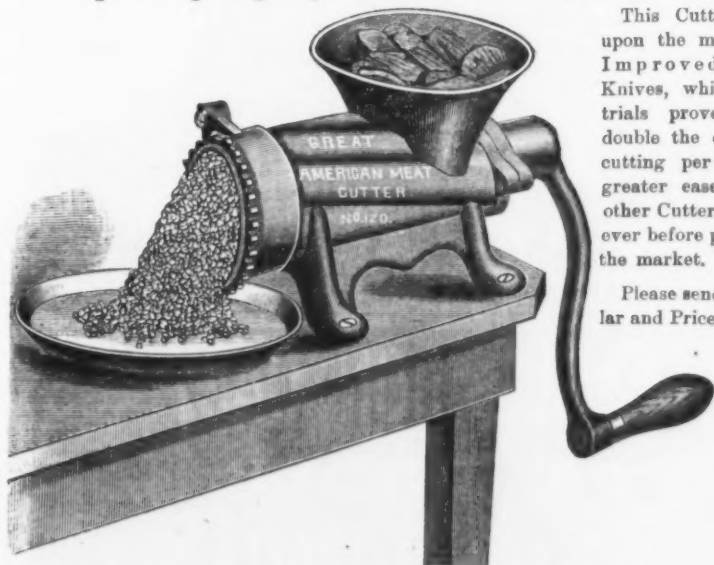
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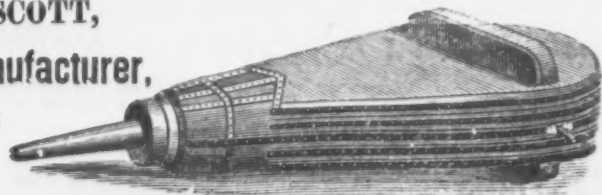
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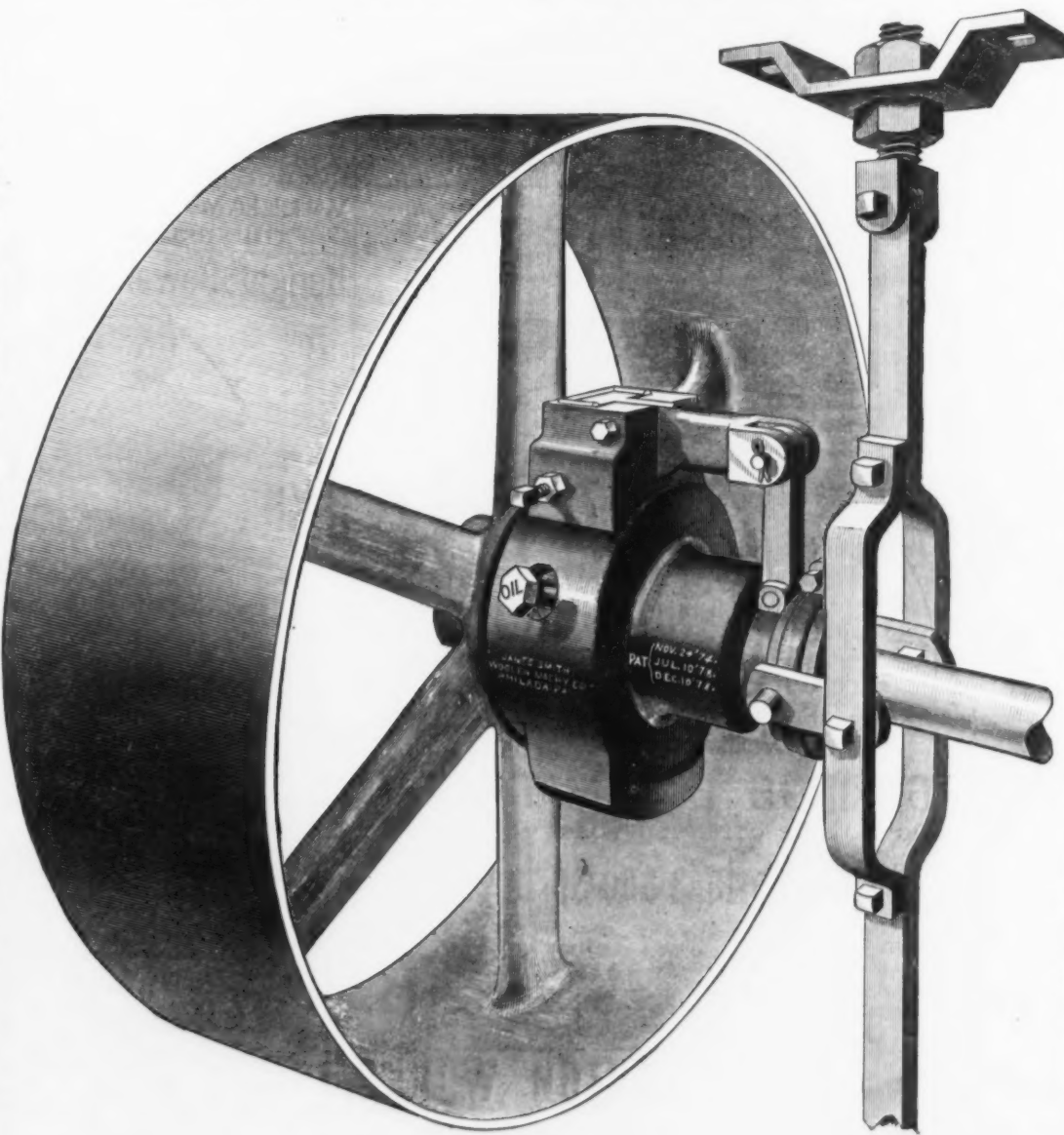
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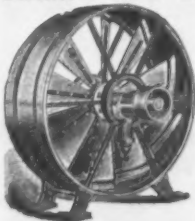
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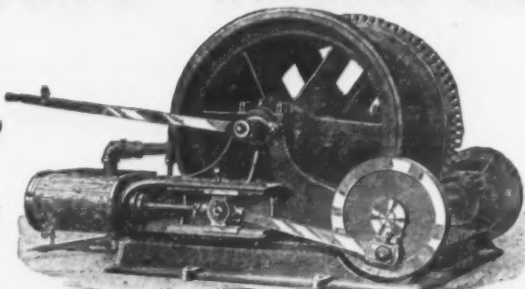
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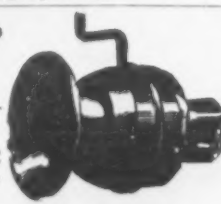
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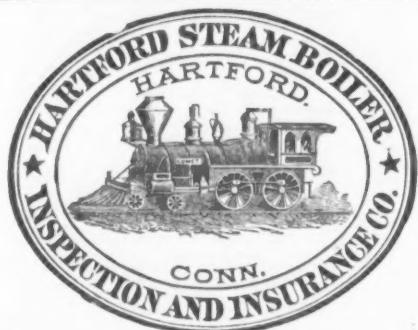
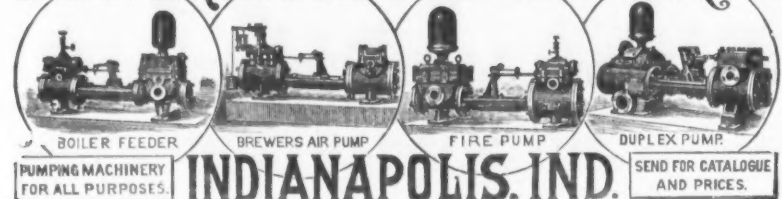
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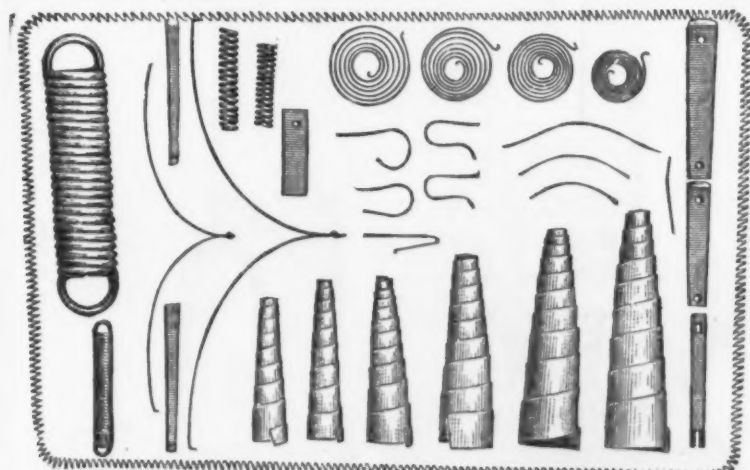
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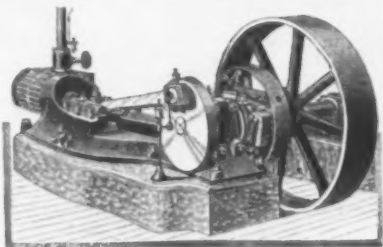
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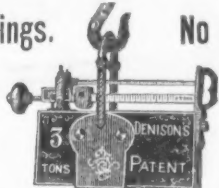
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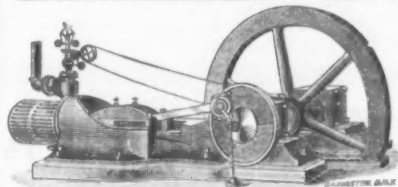
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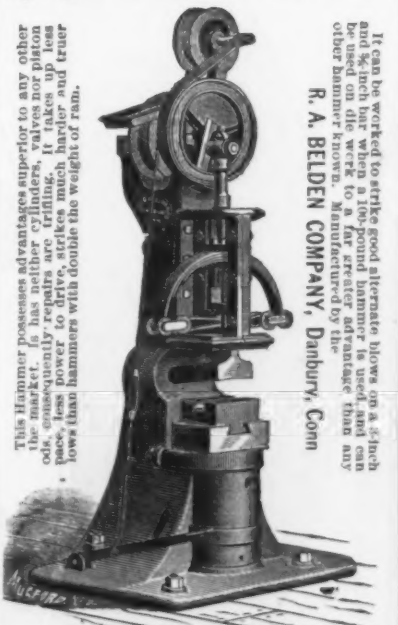
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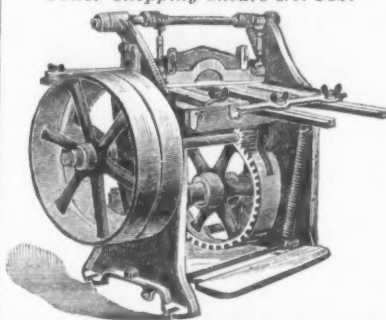


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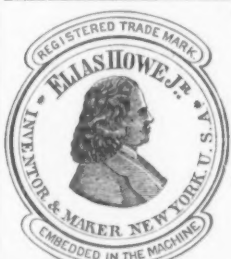
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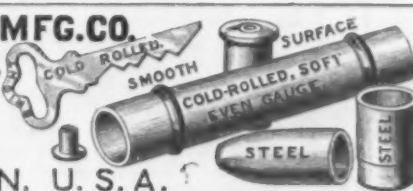
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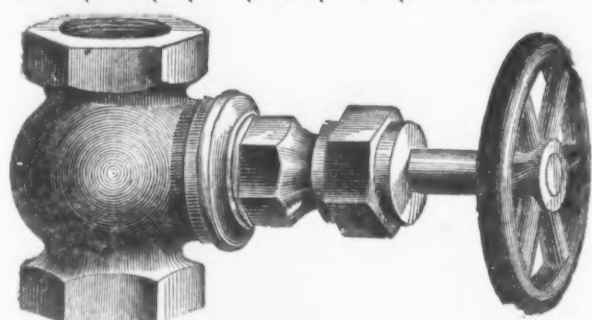
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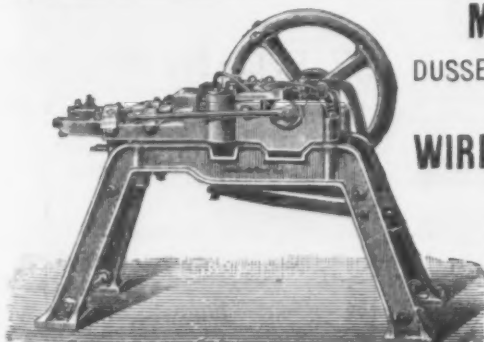
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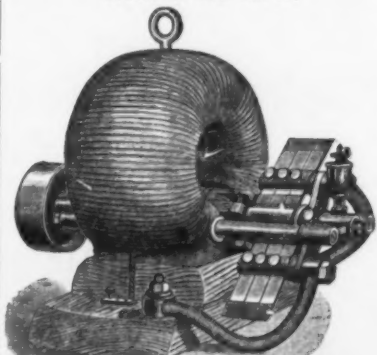
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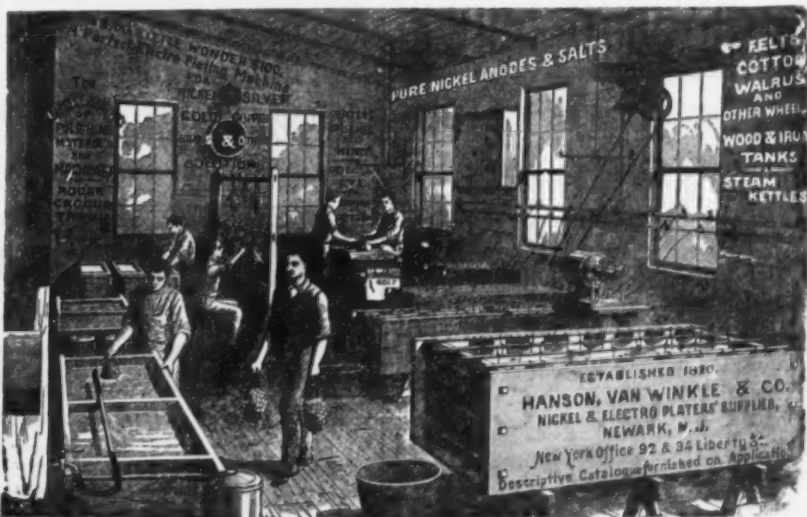
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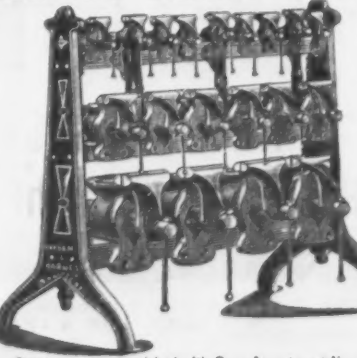


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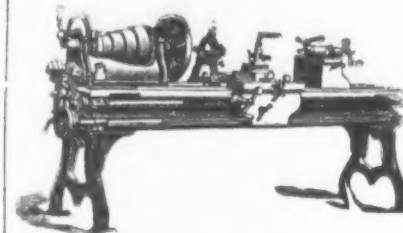
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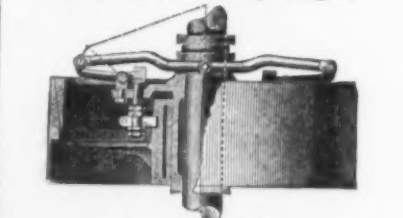
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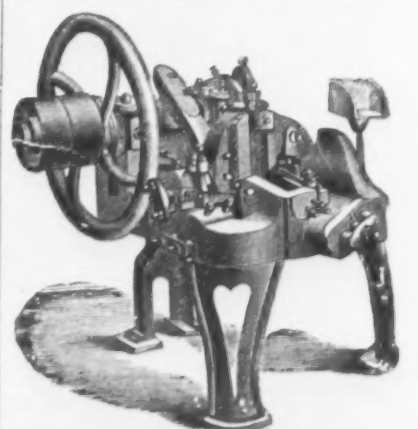
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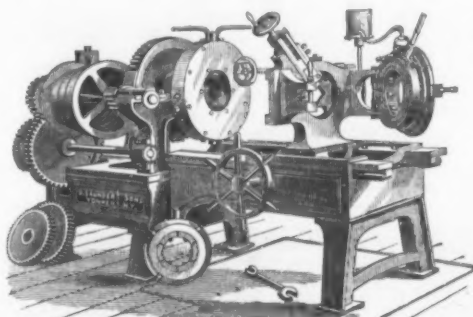
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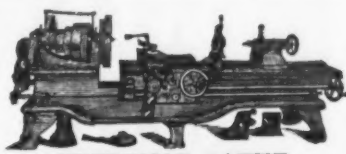
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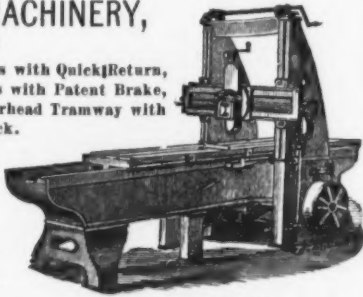
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